In This Issue Discussions from Our Remarkable September Electrical Conventions in the West and other matters of Current Interest to Men of the Electrical Industry

JOURNAL OF ELECTRICITY

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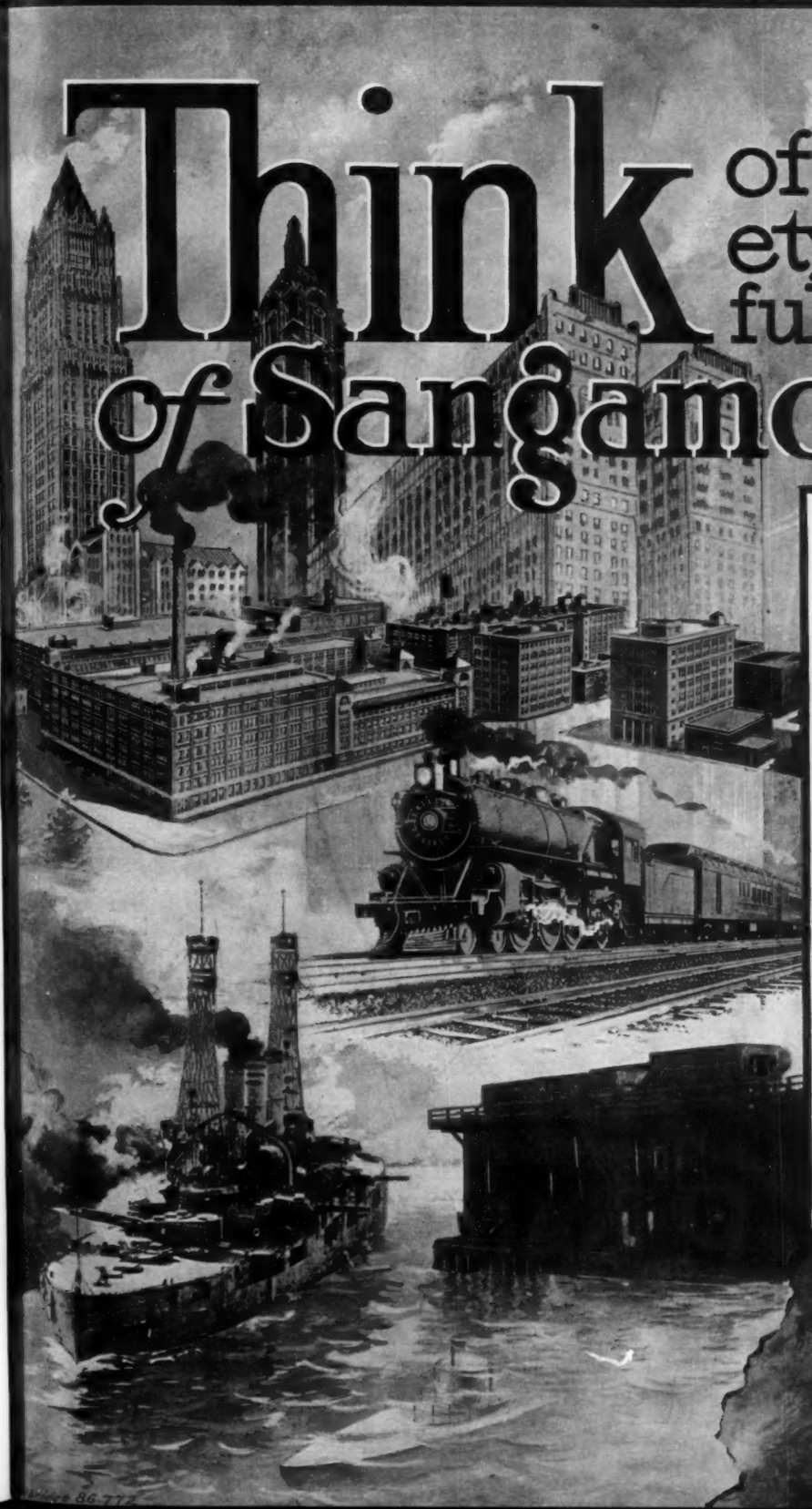

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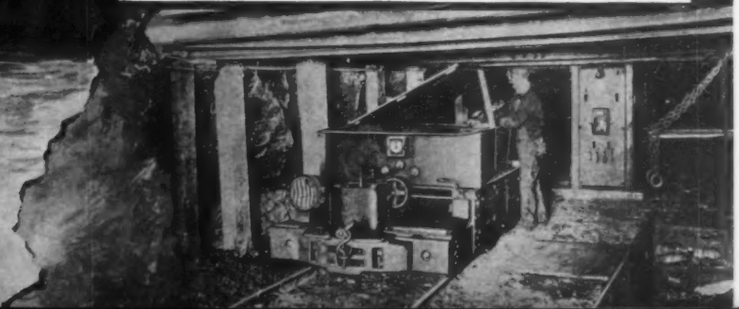

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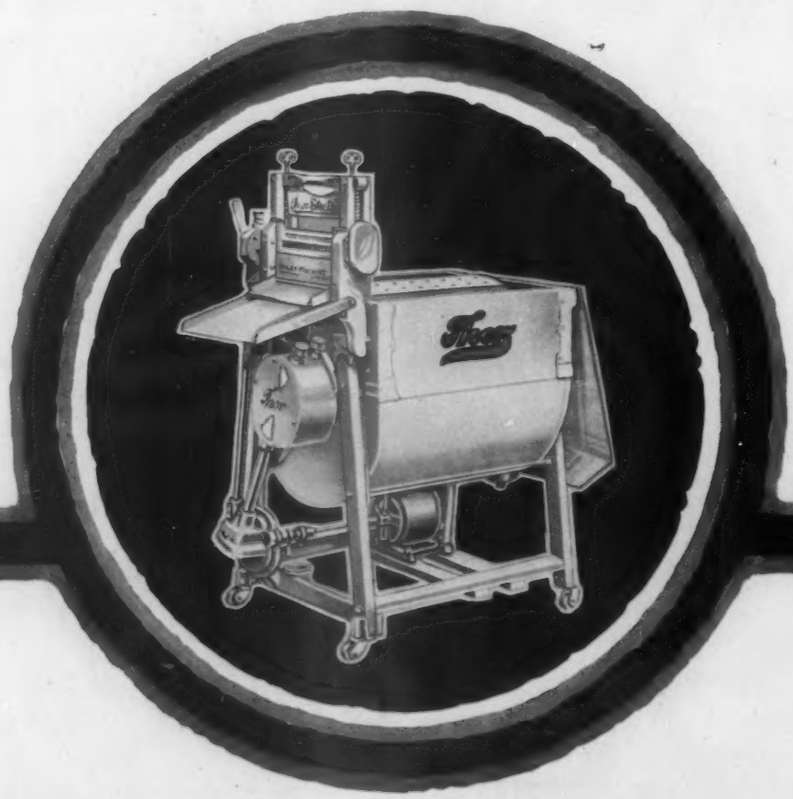

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JOURNAL OF ELECTRICITY

Devoted to the Generation, Distribution and Utilization of Energy

VOLUME XXXIX SAN FRANCISCO, OCTOBER 1, 1917 NUMBER 7

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SPOKANE'S STEAM HEATING SYSTEM

(The technical details of each new district steam heating system operated in conjunction with a city electric distribution are of interest as an index of the rapid progress which is being made in this field. Herein is given a description of the high and low pressure steam lines serving Spokane, Wash.—The Editor.)

The Spokane Heat, Light & Power Company serves the business section of Spokane, Wash., with steam for heating and with electricity for power and light. The electric current is produced as a by-product of the steam heating system. The plant is situated close to the center of distribution on Post street, adjoining the Northern Pacific Railroad right-of-way, thus facilitating the delivery of fuel.

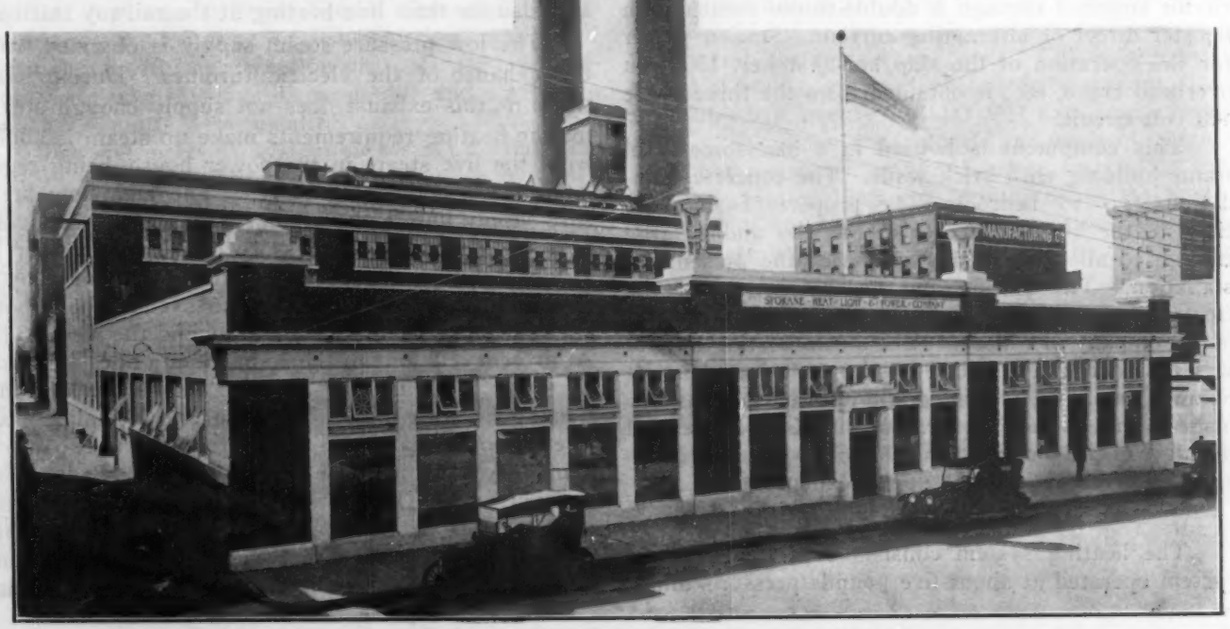
Steam is supplied at 180 lb. pressure from ten 450 h.p Wickes boilers equipped with Roney stokers. The fuel is Roslyn coal which is handled automatically from the time it is unloaded from the overhead railway track until the ashes are discharged into overhead ash bunkers. From the track hopper an apron conveyor carries it either directly to the crusher or by-passes it to a skip hoist whence a belt conveyor distributes it to a 1200 ton coal bunker. From this bunker the coal is weighed on travelling scales on either side of the firing alley and then passed into the stoker hopper.

The boilers are equipped with recording thermometers to measure the temperature of the flue gases and with indicating instruments to show the furnace conditions. Two Custodis brick stacks, 220 ft. high and 12 ft. inside diameter at the top, carry off the smoke and create the draught.

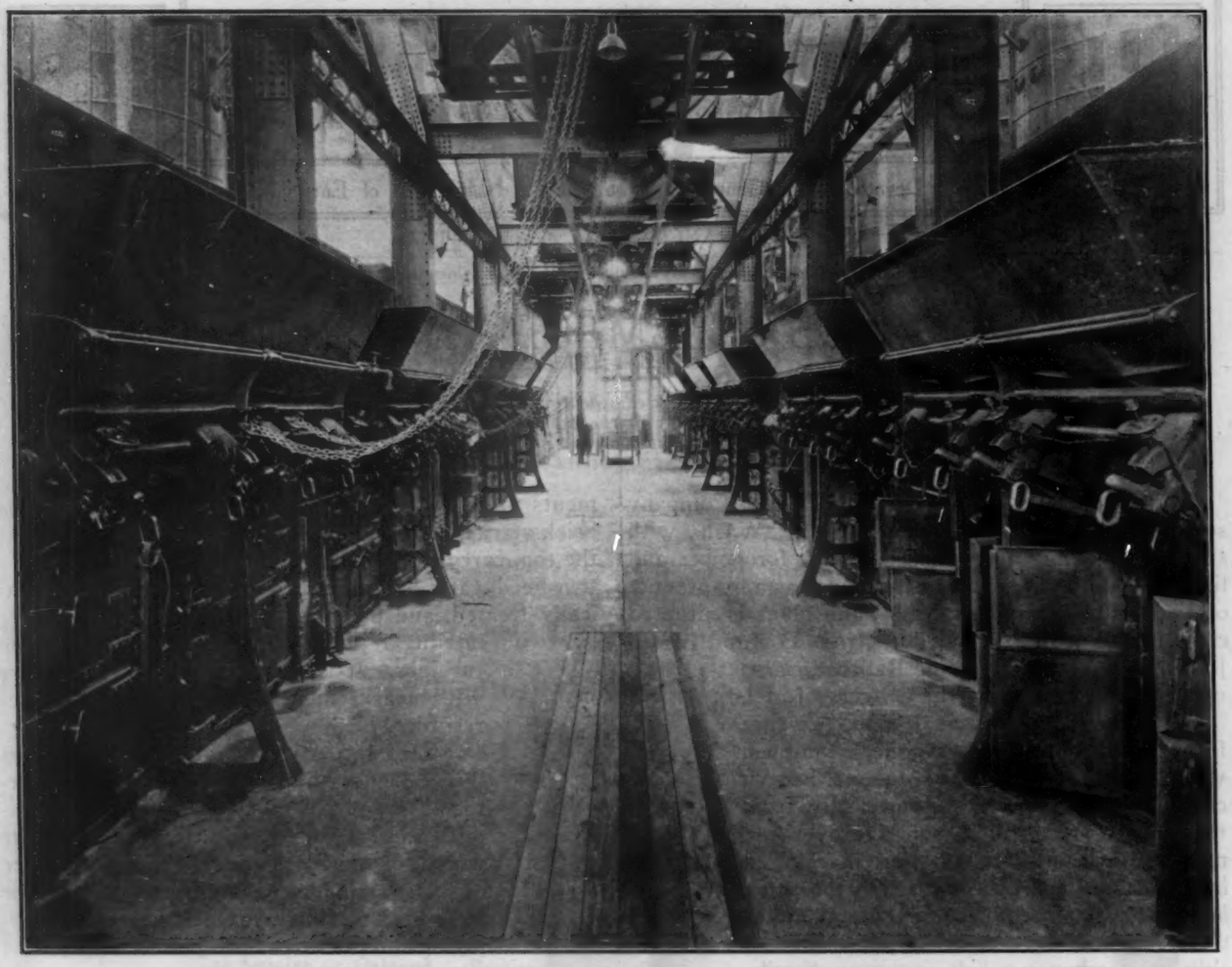
Feed water is obtained from the city mains, chemically treated, and delivered to the feed water heater by two centrifugal pumps driven by Westinghouse turbines. It is then pumped to the boilers after measurement by a Lea V-notch recorder.

Two 1500 k.v.a. Westinghouse turbines direct connected to 2300 volt generators furnish three-phase, 60 cycle current. The exciters are mounted on an extension of the generator shaft. Two sets of single-phase air blast transformers step the a.c. down for feeding two 1500 kw. rotary converters supplying direct current at 110-220 volts to the city distribution lines.

A 14-panel switchboard, equipped with necessary control, measuring and recording instruments is situated in the main engine room. All circuits to and from the board are carried in separate conduit compartments accessible from the basement. A 150 cell Exide battery, having a capacity of



Combined Office and Power Plant Building of Spokane Heat, Light & Power Company



Firing Alley, showing Wickes Boilers and Roney Stokers

1800 amperes at 250 volts for one hour floats on the d.c. bus. It is equipped with end cell switches so that it may be charged from the rotaries through booster sets. This equipment was installed by the Electric Stoarge Battery Company.

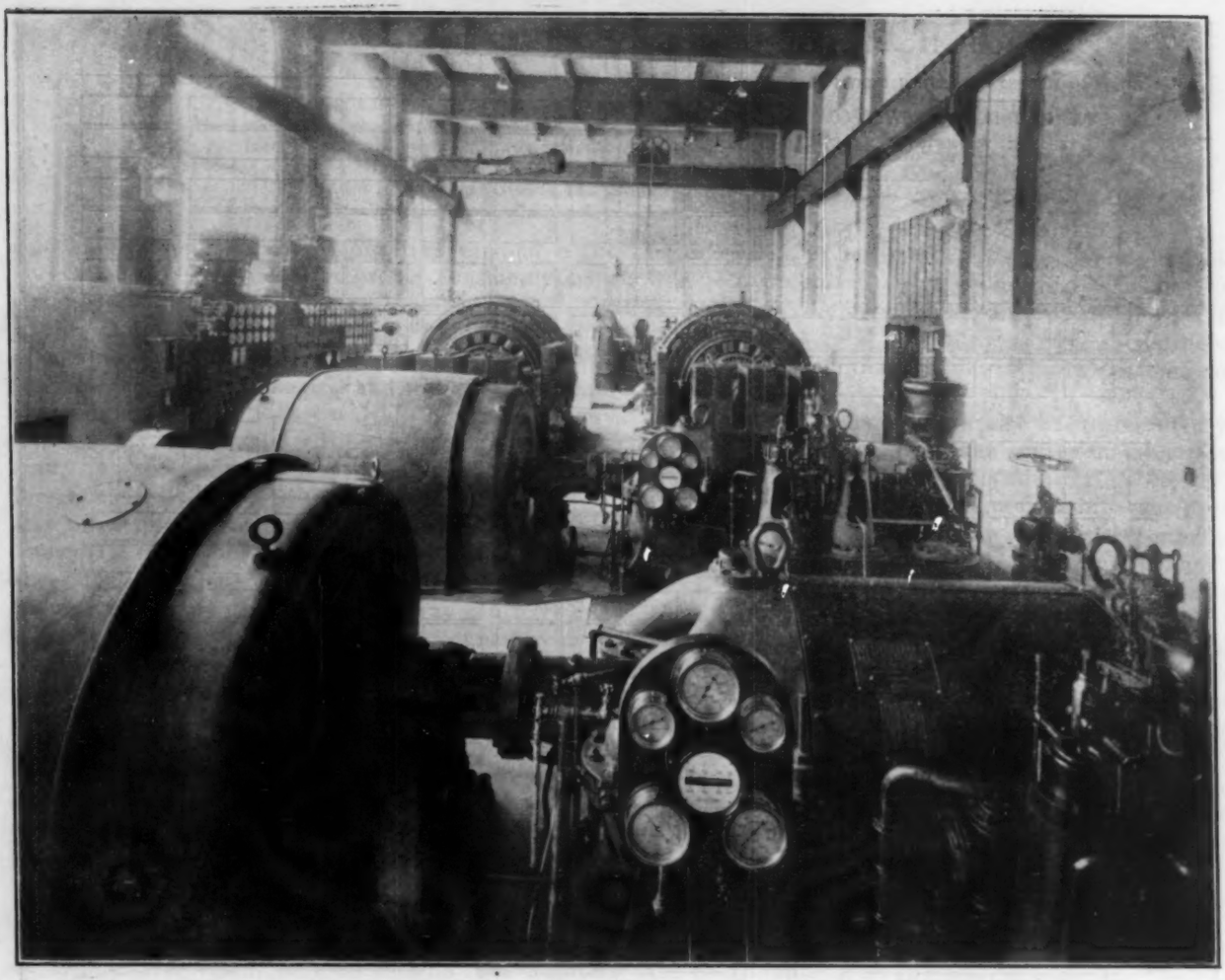
All station lights are in a three wire 110/220 volt circuit supplied through a double-throw switch with booster direct or alternating current. Station power for the operation of the skip hoist, stoker, 1500 ton overhead crane, etc., is obtained from the three-phase 440 volt circuit.

This equipment is housed in a handsome steel frame building with brick walls. The concrete foundations go to bedrock. The property is situated close to the business center of the city and is large enough to allow for a duplication of the present installation. The station and general layout of the electric distribution system was designed by the Arnold Company of Chicago. The steam heating system was designed and installed by the American District Steam Company. The foregoing information was furnished to the writer by Mr. Ludwig Kemper, general manager of the company, and the following constitutes a report by S. B. Clark, superintendent:

District Heating System

The heating system consists of a low pressure system operated at about five pounds pressure, and a high pressure system operated at approximately 125 pounds. The low pressure system is used generally for building heating purposes, for cooking apparatus and for hot water. The high pressure line serves various power users such as ventilating engines, hydraulic pumps, laundry machinery and apparatus, etc., and also for train line heating at the railway stations.

The low pressure steam supply is obtained from the exhaust of the electric turbines. During such times as this exhaust does not supply enough steam for the heating requirements make up steam is added from the live steam in the power house, being regulated through reducing valves. The main low pressure supply line to the system from the turbines consists of two 36in. low pressure lines tied together in an open tunnel at the rear of the power house by a 32 in. cross header, feeding the system from both ends, the east opening being 30 in. and the west 16 in. At present only one of the 36 in. supply lines is in use, the other being laid for a future installation of additional generating units. The 32 in. and 30 in. line is all riveted boiler plate pipe set on rollers, the expansion being taken up in these lines by copper Badger expansion joints. The 30 in. line is split at Post street into two 20 in. openings and one 16 in. opening. These openings enter directly into two 20 in. and one 16 in. mains supplying the main part of the steam un-



The Turbine Room

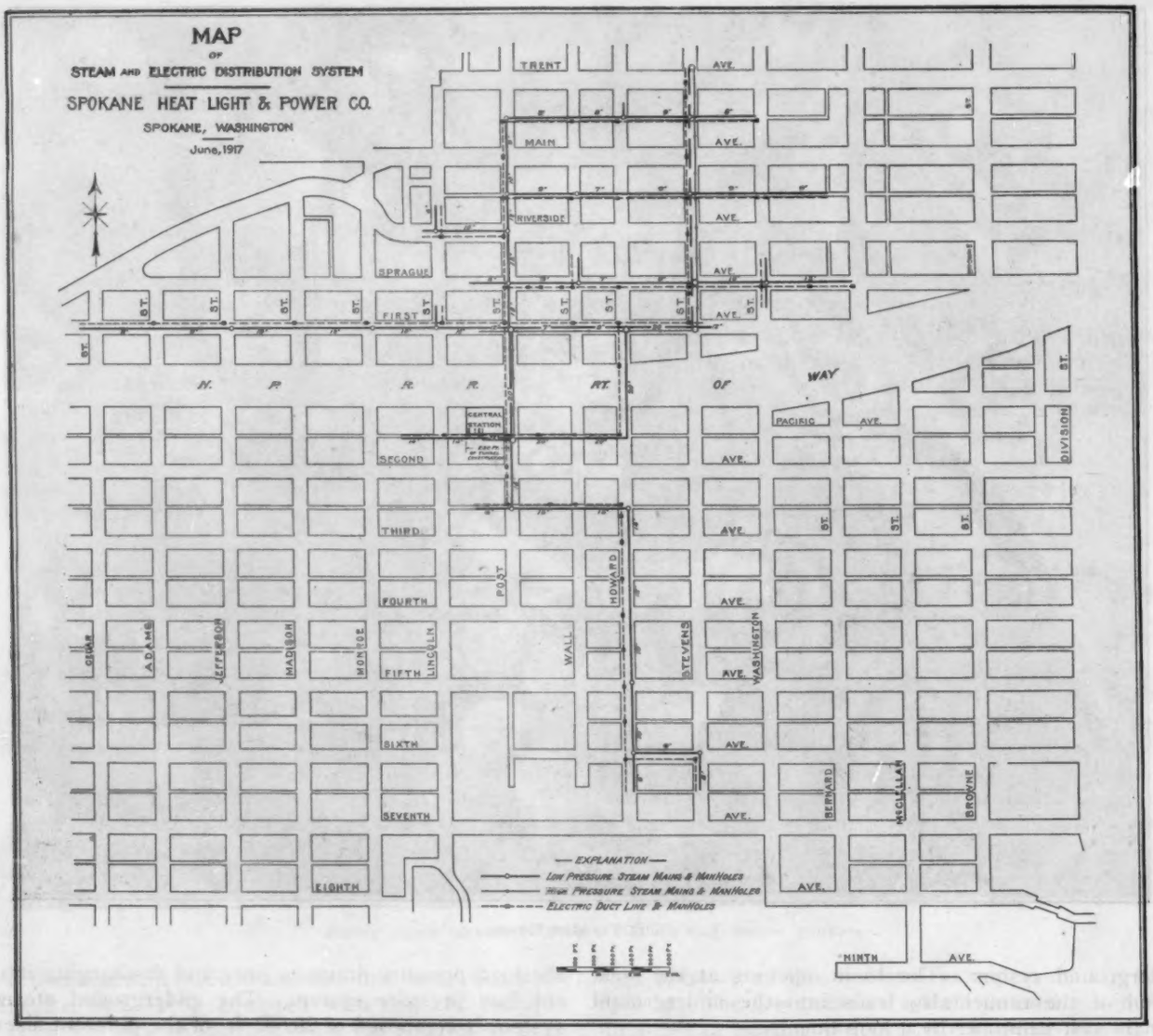
derground system. The 16 in. opening at the west end of the tunnel also leads into the underground main system proper by a loop line.

The general plan of the underground steam mains and area covered is shown on the map. Both the low and high pressure steam main system were installed by the American District Steam Company. Their standard variator type of construction was used throughout with the exception of the larger low pressure lines where low pressure double and single slip expansion joints were installed.

The high pressure system covers but a small portion of the total heating area and supplies buildings only for the special cases enumerated above. A 5 in. high pressure line from the power house supplies the high pressure system, later being reduced to 4 in. Slip joints for expansion are used on this line and located in accessible manholes for proper maintenance. Owing to the difficulties of construction and obstructions encountered in the street, it was impossible to align and grade the high pressure system properly. For this reason it was necessary to install a number of high pressure traps, which later on were found to be unreliable, causing a great deal of trouble and maintenance expense. The difficulty was finally overcome by installing small wire drawing by-passes in the high pressure drainage lines and discharging into the low pressure system. The underground steam system is composed of 20,682 ft. of the different sizes of steam mains.

The underground electric system was installed at the same time as the steam and in most cases was built above and in the same trench. Particular attention was given in the electric underground system to large manholes and service boxes. The Edison three-wire 120-240 d.c. system is installed throughout. Feeder cables are mostly of 1,000,000 c.m. lead covered cable. The mains and neutrals are made of different sizes but unusually heavy. Feeders are tied in solid with the station buss and terminates on the system in manhole type junction boxes and tied to junction box busses with fuses. All mains terminate in junction boxes at each intersection of the cable system and are also tied to busses through fuses. Pilot wire cable was installed on feeder terminal point having a positive, negative, and neutral pilot wire leading back to station switchboard.

The steam service pipe leading to buildings are taken in all cases from the service variator openings. The company installs the service pipe just inside of the building wall and also installs at this service entrance the necessary valves for controlling the in-



Map of Steam and Electric Distribution System

terior steam connections. In some cases this company has found it advisable to do all of the necessary pipe work inside of a building in order to properly connect the existing system with our steam service. We have endeavored in all cases to install piping and apparatus in the buildings so as to give in all respects the most economical service. This interior work covers connections to a great number of different steam heating systems, hot water systems, restaurants, laundries, etc. For the hot water uses in the buildings we manufacture an instantaneous hot water heater and installed so that the temperature of the hot water so manufactured is thermostatically controlled. We are using in all cases cooling coils for the purposes of obtaining all heat from the water of condensation before it is emptied into the sewer. We have endeavored also to economize in steam heating by use of thermostatic controls.

All electric service pipes and cables are connected to the main system at our service boxes. Service cables are all tied in solid. This company furnishes and maintains an ironclad interior service installation. We are also using meter testing blocks.

To Ascertain the "Normal Reading."—An excellent method for ascertaining the normal reading of the steam calorimeter has been proposed by the Power Test Committee of the American Society of Mechanical Engineers. This method is described on page 1415 of Vol. 37, Transactions A. S. M. E. for 1915.

To determine the "normal" reading of the low-pressure thermometer corresponding to dry steam, the instrument should be attached to a horizontal steam pipe in such a way that the sampling nozzle projects upwards to near the top of the pipe, there being no perforations and the steam entering through the open top of the nozzle. The test should be made when the steam in the pipe is in a quiescent state, and when the steam pressure is maintained constantly at the point observed on the main trial. If the steam pressure falls during the time when the observations are being made, the test should be continued long enough to obtain the effect of an equivalent rise of pressure.

THE ENGINEERING COUNCIL

BY IRA N. HOLLIS

(Serious thought has long been given by engineers, looking toward some means of perfecting unified action of all the great national engineering societies in matters of common interest. Here is an article by the president of the American Society of Mechanical Engineers that is worthy the careful consideration of engineers of the West. The engineering council, composed of representatives from the four great national societies, bids well to perform a timely and useful function in the present critical affairs of the nation.—The Editor.)

The formation of an Engineering Council is the outgrowth of a real need for proper consideration of questions of general interest to engineers and to the public, and to provide the means for united action upon questions of common concern. Many such questtons have come up in the past and will arise in greater number in the future. This war has brought out very impressively the actual need for united action of some kind. At present the Council is concerned only with four Societies because that seemed the most practical way of getting a group of men together to answer the immediate needs, but these Societies do not assume to speak for all engineering societies in the country. Criticism that they are exclusive in any way is utterly mistaken. There is the hope that such a Council by proving itself effective may lead to much wider co-operation in a strictly representative body for all engineers, and thus pave the way for a very much larger union in the future.

How can the Council be enlarged? By a union of all Societies either as the outgrowth of the present Council or by a congress of engineers leading to united action by all Societies. The first method will be the most natural one because many local societies and national societies also have a large membership in the four societies at present concerned. We have three classes of engineers to reach: first those who are members of local societies and not members of national societies; second, those who are members of national societies and not members of local societies, and third, those who are members of no society. The last named class constitutes a very large number in our profession. We are almost as mixed as American citizenship and we suffer therefrom just as much as America with a population representing every race and every people in Europe. There can be no question of the enormous advantage of union. That union should be completed by strengthening the existing agencies and not by the formation of new societies. The national societies are thoroughly national notwithstanding an occasional complaint that they are run by New York. If they have not been able to express the democratic spirit of our country as fully as might be desired it is the fault of the members in all the states and not of the city in which the principal offices are located.

The four societies concerned at present are the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers. They have come together in pairs from time to time in the past for special purposes and there have been general conferences on subjects requiring immediate settlement, but until the Council was definitely organized in June there was no permanent body to advise all the Societies. We have had many fruitful discussions in the past leading to useful action. The Standardization Committee which has been organized to represent five Societies has passed upon commercial standards of all kinds. This committee has great possibilities and it should be enlarged enough so that its influence may become very widespread.

Many problems have already been presented befor the Council. Its personnel made up of twenty-four men representing equally the four societies is well balanced and judicial. The first duty was necessarily the organization and appointment of standing committees which have already been reported in the press. They might with advantage be mentioned here:

1. Committee on Public Affairs, comprised of Messrs. C. W. Baker, G. F. Swain, S. J. Jennings and E. W. Rice.

2. Committee on Rules, comprised of Messrs. J. P. Channing, Clemens Herschel, N. A. Carle, and D. S. Jacobus.

3. Committee on Finance, comprised of Messrs. B. B. Thayer, I. E. Moultrop, Calvert Townley, and Alex. C. Humphreys.

Certain questions relate, however, to the war and the assistance that engineers can render. A committee to be called the American Engineering Service Committee was appointed with instructions to invite the co-operation of all engineering societies. This committee in the first instance consists of A. D. Flinn of the Civil Engineers, A. S. McAllister of the Electrical Engineers, George J. Foran of the Mechanical Engineers, G. C. Stone of the Mining Engineers and E. B. Sturgis of the Mining and Metallurgical Engineers. Its present duty is the tabulation and listing of the members of the five societies represented, in order that we as a profession may be in a position to take a larger part in the industries after peace is declared. This tabulation has already in part been done, but in a rather unsystematic and unequal way. It is hoped that the new committee by having additions from other societies may make a final and lasting tabulation of all the engineers in the United States. The list is to be kept in the Engineering Building for general use in government problems and in the industries. At present the committee is devoting its attention to the immediate need of the hour, namely, the procurement of men for special service in the government. A list of specialties in the societies has already been completed. There are three methods by which engineers may enter United States Service; first, through some organization, second, through individual application to a department of the government, and third, through selection by the Conscription Law. But this is War Service wholly and not Civil Service which is the same now as it has always been. As a matter of fact a great many engineers have already entered through the engineering societies, through colleges

and through various special boards in Washington. The importance, however, of a complete list of engineers and their professional specialties cannot be overrated. Such a complete list can be made only with the help of the local as well as of the national societies. The committee mentioned above is organized with George J. Foran as chairman and A. S. McAllister as secretary. All societies should respond to the request for co-operation.

Another committee of which Harold W. Buck is chairman is called the War Committee of Technical Societies. The members are Messrs. H. W. Buck, A. M. Greene, R. N. Inglis, C. R. Corning, G. C. Stone, D. W. Brunton, J. M. Boyle, J. V. Davies, Joseph Bijur, A. S. McAllister, W. D. Richardson and Charles Baskerville. It was appointed to assist any organization in Washington, such as for instance, the Council of National Defense, the National Research Council and the Naval Consulting Board, in any way in which it can bring to the attention of the engineers of the country the necessity for thought and help in the numerous problems that arise. A Council organized by the enlargement of the present Enginering Council can be very effective in many ways, without interfering with the autonomy of any individual society. Every society has some definite purpose of its own and also some which it holds in common with all other societies. One of the latter purposes relates to public service and to co-operation. To the end that all societies may understand fully their opportunity, the committee of which Mr. Foran is chairman has made a complete list of all the societies and their officers and communications will be sent out inviting co-operation and it is hoped that the Council may be successful in arousing sufficient interest to bring about a larger and better Council for all engineers.

In organizing the council provision was made for the election to membership of other national engineering and technical societies. There is no doubt that rules can be made under which these societies may become members. This will involve consultation and discussion in the future.

The office of the Council will be in the Engineering Building, 29 West 39th street, New York City.

THE TRIUMPH OF ELECTRICITY

At the annual general meeting of the Waverley Association of Gas Managers, held in Edinburgh recently, Mr. J. D. Keillor (Hawick), the president, in the course of his address, said the opposition of electricity was so formidable that if gas was to maintain an honorable position in the realm of light and power they would have to apply a driving force so great and of such endurance that their place would be for ever assured, and that gas would be a force to be reckoned with. They should remember that they were not monopolists in the supply of light and power. Their rival had received all the care and support that scientific thought and influence could bestow upon it, and speaking generally, had enjoyed an amount of patronage and encouragement never bestowed upon gas. To what extent, it might in future be developed was a matter of speculation, but he felt sure that soon its opposition would be more formidable than ever. Their attention had been directed to a movement in which the board of trade was taking an active part—the proposal to link-up electric supply undertakings in certain industrial centers.

A NEW USE FOR THE ELECTRIC FAN

In outlining a campaign for selling electric fans and building up the fan load, it will be interesting and instructive to first write to the division of publications, Department of Agriculture, at Washington, and secure a free copy of bulletin 841, which, among other things, has to say:

It has been found that many sliced vegetables and fruits placed in long trays 3 by 1 foot and stacked in two tiers end to end before an electric fan can be dried to the requisite dryness within 24 hours. Some require much less time. For instance, sliced string beans and shredded sweet potatoes will dry before a fan running at a moderate speed within a few hours. In many cities the electric fan will cost not more than one-fourth of a cent an hour to run. The fan should be placed close to the stacks of trays, and they should not be filled so full that the air can not pass freely through them. The fan method has a marked advantage in that product keeps cool owing to evaporation while it is being dried, thus tending to retain the color and eliminate spoilage.

NEW ELECTRICAL USES IN THE RECOVERY OF RARE METALS

The U. S. Bureau of Mines in technical paper 177 has just published an interesting account of the preparation of ferro-uranium. The results of the study are presented in the belief that they will be of aid in developing the use of ferro-uranium, particularly in the manufacture of special steels.

In summarizing the bulletin it appears that by using a pure UO_2, a low-ash coke or charcoal, and a pure iron as raw material, with CaF_2 as slag former, and using a tilting direct-arc type of furnace with water-cooled magnesite hearth and sides, it should be possible to produce commercially, without a second refining operation, ferro-uranium of any desired content, say 40 to 70 per cent, with a carbon content averaging less than 2.0 per cent, a silicon content of less than 0.75 per cent, a vanadium content of less than 0.5 per cent, and with aluminum, sulphur, phosphorus and manganese contents all so low as to be negligible.

The power consumption should be decidedly less than 3 kilowatt-hours per pound of alloy. The loss of U in the reduction process should be less than 15 per cent.

If experiments show that uranium steels high in uranium are not valuable, but that a little uranium in steels is useful, and if the amount required is so low that the carbon introduced by a high-carbon alloy is harmless, then the furnace might have an uncooled carbon hearth, and the alloys would contain 4 to 5 per cent carbon.

If uranium is found useful only as a deoxidizer or scavenger of oxygen and nitrogen, aluminum would not be harmful and might be advantageous, and the slag former might be wholly or in part Al_2O_3.

HYDRO-ELECTRIC ENERGY AS A CONSERVER OF OIL

(The strongest argument for the immediate need of Federal legislation encouraging the development of water power is found in this extract from the report of the Petroleum Committee of the California Council of Defense. Incidentally it also presents a comprehensive survey of power conditions on the Pacific Coast.—The Editor.)

The possibility of the further conservation of California petroleum and its products through a more extensive and efficient utilization of hydroelectric energy, both during the war and thereafter, has been carefully considered by the Petroleum Committee of the California State Council of Defense. The committee has had the benefit of two special reports dealing with the general problem, the one received from the Pacific Coast Section of the National Electric Light Association over the signature of Mr. H. F. Jackson, president, and the other from Mr. F. Emerson Hoar, gas and electrical engineer of the California Railroad Commission.

The problem of conserving fuel through the substitution of water power is not a new one in California and other Pacific Coast States, as will be apparent from the fact that hydroelectric development in California has increased 800 per cent in the last fifteen years. It is interesting to note that during the same period the production of petroleum increased less than 700 per cent.

The total installed capacity of existing hydroelectric plants in California, Washington, Oregon, Nevada and Arizona is about 1,288,600 horsepower, of which 731,000 horsepower, or 56.8 per cent, is in California. The combined output of these hydroelectric plants, if reproduced by steam power, would require the annual expenditure of not less than 19,000,000 barrels of fuel oil.

The minimum potential water power resource of California, according to estimates made by the U. S. Geological Survey in 1908, as revised by the Commissioner of Corporations in 1912 and by the Secretary of Agriculture in Senate Document No. 316, Sixty-fourth Congress, first session, is 3,424,000 horsepower, and the minimum combined resources of the five states mentioned is reported to be 12,619,000 horsepower, or 45 per cent of the water power resources of the entire country. Of these potential resources, approximately one-third can be developed as required at an average investment cost which will permit of successful and profitable operation under present conditions of the western power market. This information, over a ten-year period, is shown herewith for fifteen years, from 1902 to 1917, segregated by states:

Water Power Resources and Hydroelectric Development of Pacific Coast States in Horsepower

Item	California	Oregon	Washington	Nevada	Arizona	Total
Minimum potential water power resources	3,424,000	3,148,000	4,928,000	172,000	893,000	12,619,000
Estimated practical developments under present conditions	1,100,000	950,000	1,200,000	20,000	280,000	3,550,000
Installed capacity of hydroelectric plants—						
1902	91,656	31,089	24,089	2,296	320	149,450
1907	216,150	138,779	67,714	6,812	934	430,389
1912	440,243	168,807	279,760	12,709	9,346	910,865
1917 (estimated)	731,000	176,800	333,600	13,500	33,700	1,288,600

The vast water power resources of California and other states now consuming California petroleum and its products are of particular interest at this time because of the present critical situation affecting the supply of liquid fuels. The only relief, however, which may be anticipated from this source during the war will come from a more complete and efficient utilization of existing hydroelectric capacity.

At the present time over 21,500 horsepower of developed hydroelectric plants in California are not available for use in the industrial centers of the state, because of inadequate line capacities and lack of proper interconnections between the systems of the larger producing companies. The annual output capacity of this excess power is equivalent to about 668,500

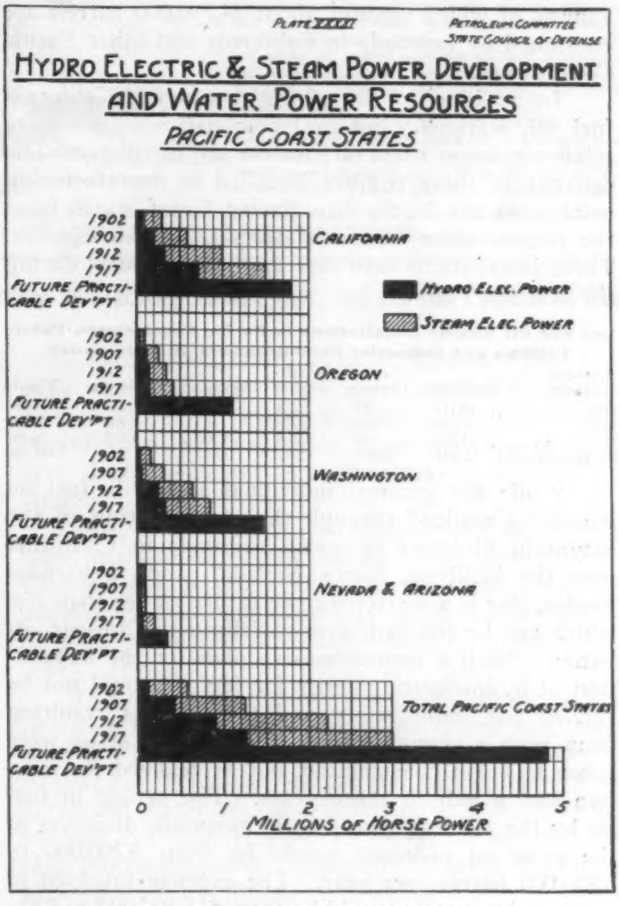


Chart of Pacific Coast Power Resources

barrels of fuel oil. In addition to the unavailable actual excess capacity in hydroelectric plants of the individual companies operating in this state, the failure to take advantage of the diversity between the system peak loads of these various companies and the inability at the present time to utilize fully the stream flow at the separate plants because of the lack of interconnections between the individual transmission systems, represent a waste of electric energy, which is equivalent to not less than 1,100,000 barrels of fuel oil annually. Adequate and proper intercon-

nections between the larger independent transmission systems would remedy this situation.

The present installed capacity of public utility and industrial steam power plants in the five Pacific Coast states hereinbefore mentioned is about 1,729,600 horsepower, of which total approximately 804,900 horsepower is installed in California.

The present fuel oil consumption of these steam power plants is at the rate of about 9,770,000 barrels per year, of which amount some 3,950,000 barrels are consumed in California outside of the oil fields.

Steam Plant Installation in Pacific Coast States, Public Utilities and Industrial Establishments, in Horsepower

Installed capacity	California	Oregon	Washington	Nevada	Arizona	Totals
1902	220,937	59,404	140,110	1,156	16,498	438,105
1907	397,986	114,132	263,016	3,392	34,973	813,499
1912	664,987	196,112	393,276	8,808	56,787	1,319,970
1917(estimated)	804,900	267,800	522,000	22,400	112,500	1,729,600

Railroads at the present time consume approximately 33,996,000 barrels of California fuel oil per annum, of which amount about 24,790,000 barrels are consumed by railroads in California and other Pacific Coast states.

In addition to the plants consuming California fuel oil, stationary internal combustion engines are relatively larger users of gasoline and distillates. The capacity of these engines installed in manufacturing establishments in the five Pacific Coast states is at the present time approximately 17,980 horsepower. These installations have decreased continuously during the last ten years.

Gas and Oil Engine Installations in Pacific Coast States, Public Utilities and Industrial Establishments, in Horsepower

Installed capacity	California	Oregon	Washington	Nevada	Arizona	Totals
1902	10,111	475	1,218	262	2,120	14,186
1907	27,788	667	1,776	965	1,833	33,039
1912	13,832	906	1,764	1,266	1,115	18,883
1917(estimated)	13,000	1,010	1,750	1,440	780	17,980

While the greatest individual saving in fuel oil would be realized through the electrification of the mountain divisions of steam railroads in California over the Siskiyou, Sierra Nevada, and Tehachapi grades, this is a matter for the future rather than one which can be counted upon to relieve the present situation. Such a comprehensive plan for the subsitution of hydroelectric energy for fuel oil could not be carried out immediately and the benefits resulting from such a change would, if immediate steps were taken to begin construction, not be realized for from two and a half to three years. The saving in fuel oil by the electrification of the mountain divisions of the principal railroads would be from 3,200,000 to 3,800,000 barrels per year. The expense involved in making the change would be from $17,500,000 to $20,000,000.

Viewing the matter from a practical standpoint, the only early relief which can be anticipated from a greater use of hydroelectric energy will result from the interconnection of the more important electric transmission systems, thus making usable a larger proportion of the available developed water power. This additional energy if utilized for power purposes, both in the steam plants and those of industrial users of fuel oil, will permit the almost immediate conservation of approximately 1,500,000 barrels of fuel oil per year.

The substitution of electric power for that produced by internal combustion engines accessible to existing electric distribution lines in California would, in all probability, effect an annual saving of about 550,000 barrels of gasoline and engine distillate, but in order to fully accomplish this result it would be necessary to develop considerable additional power, which presumably will not be practicable during the war because of the impossibility of obtaining prompt delivery of electrical equipment and the time required to develop hydroelectric properties.

Relative Prices of Fuel Oil and Coal

Whether fuel oil or coal will prevail as a fuel would ordinarily depend upon the play of well known economic forces, among which are the relative price of the two fuels, bearing in mind their relative efficiency, and the convenience of their respective use.

Pacific Gas & Electric Company, which company has made a careful study of this subject, reports to us that the average heating value of coal heretofore sold in California and adjacent states, and produced in Colorado, New Mexico, Washington, Wyoming and Utah, has been approximately 11,933 British thermal units per pound of dry coal. Assuming a boiler efficiency of 65 per cent, 7150 British thermal units would be available from this coal. California fuel oil has a heating value of approximately 18,500 British thermal units per pound and can be burned with an efficiency of 75 per cent, so that the boilers absorb 13,870 British thermal units from each pound of oil. Consequently, one pound of fuel oil is equal, for steaming purposes, to 1.94 pounds of coal of the character hereinbefore referred to. One ton of this coal, containing 2000 pounds, would therefore be equivalent to 3.07 barrels of oil, or approximately three barrels.

The price of California petroleum of between 14 and 17.9 degrees Baume gravity is now 98 cents per barrel at the wells, and $1.45 per barrel delivered on San Francisco Bay. The price of coal at San Francisco is indefinite at the present time. Coal dealers report that they are securing between $10 and $11 per ton for small quantities. Assuming, merely for the purpose of the illustration, that coal could be secured at San Francisco in large quantities for $8 per ton, fuel oil would have to advance to $2.66 per barrel before it would be equivalent in price to coal.

It is evident that at the present relative prices of fuel oil and coal in California, few consumers of fuel oil will voluntarily give up its use and revert to coal if they can have an assurance of a continued supply of fuel oil.

PORCELAIN ELECTRICAL SUPPLIES SHOW LARGE INCREASE

The value of porcelain electrical supplies marketed in the United States in 1916 was $7,034,420, an increase of $2,363,218 over 1915, according to the United States Geological Survey, Department of the Interior. These wares were reported from 10 states, of which Ohio was the leader, reporting wares to the value of $2,181,026. New Jersey was second, with $1,674,093, and New York, third, with $1,623,433. These three states reported 78 per cent of the value of the entire output.

DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary
BUREAU OF MINES
VAN H. MANNING, Director.

RESUSCITATION

COMPILED BY
DR. YANDELL HENDERSON

FROM GAS ASPHYXIATION, DROWNING, AND ELECTRIC SHOCK

GAS ASPHYXIATION.—Remove the victim from the poisonous atmosphere. If he is still breathing, administer oxygen from a tank with a bag and mask for 20 minutes. If he is not breathing and his jaws are locked so as to interfere with effective artificial respiration, pry them open and wedge with a piece of wood, and remove any foreign body from his mouth Then give artificial respiration as shown below.

DROWNING.—As soon as the victim is taken from the water place him face downward, clasp your hands under his stomach, and lift him several times, letting his face hang down so as to drain his mouth and throat. Remove from his mouth any foreign body (tobacco, false teeth, or gum). Do not stop to loosen his clothing. Do not carry him any distance. Do not wait for a doctor. Treat him yourself as shown below.

ELECTRIC SHOCK.—With a single quick motion free the victim from the current. Use any *dry* nonconductor (clothing, rope, board) to move either the victim or the wire. Don't take hold of the live wire, and beware of using metal or any moist material. Send someone to shut off the current. If the victim is not breathing remove from his mouth any foreign body. Then give artificial respiration as shown below.

Begin Artificial Respiration at Once

Lay the victim on his belly with his face to one side so that his nose and mouth are free for breathing Place the victim's arms and hands exactly as shown in figs. 1 and 2, one arm straight out beyond his head, the other under his head. This position is important as it helps to expand his lungs. In drowning cases have the head a little lower than the body.

Kneel, straddling the victim's thighs and facing his head, rest the palms of your hands on his loins (on the muscles of the small of his back), with your thumbs nearly touching each other and with fingers spread over his lowest ribs (see fig. 1).

With arms held straight, swing forward slowly so that the weight of your body is gradually, but *not violently*, brought to bear upon the victim (see fig. 2). This act should take about two seconds.

Then, leaving your hands in place, swing backward slowly so as to remove the pressure, thus returning for two seconds to the position shown in figure 1.

Repeat deliberately 16 to 20 times a minute the swinging forward and backward—a complete respiration in about four seconds. Keep the movements in time with your own breathing.

Figure 1

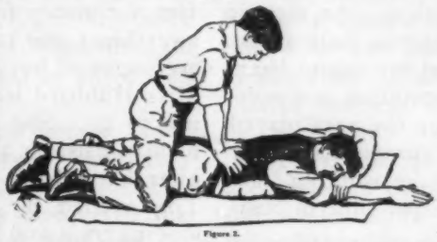


Figure 2.

Every Moment of Delay is Serious.

While the artificial respiration is being continued, have an assistant draw forward the victim's tongue, if it has fallen back (fortunately it usually falls forward when the victim is face down). Hold the tongue out if it tends to draw back, by wrapping a handkerchief around it. The handkerchief may also protect the assistant's fingers from being bitten. The assistant should also loosen any tight clothing around the victim's neck, chest, or waist.

Do not permit bystanders to crowd about and shut off fresh air. Keep the victim warm with proper coverings and by placing beside his body hot bricks, bottles, or rubber bags filled with warm (not hot) water. Wrap bricks, bottles, or bags so as to prevent burning the victim.

Continue the artificial respiration *without interruption* until natural breathing is restored, or for at least three hours. If natural breathing stops after being restored, use artificial respiration again.

Do not give any liquid by mouth until the victim is fully conscious. Keep the victim flat. If after being partly resuscitated he must be moved, carry him on a stretcher. It is dangerous to make an ill person, or one injured in any way, sit up or stand. To make him walk may cause his death.

This chart shows the Schaefer, or prone pressure, method of artificial respiration, as adopted by the Committees on Resuscitation from Mine Gases and Electric Shock, which were appointed by the United States Bureau of Mines, the National Electric Light Association, the American Institute of Electrical Engineers, and the American Medical Association. These committees included Prof. W. B. Cannon, Prof. Yandell Henderson, Prof. Joseph Erlanger, Dr. George W. Crile, Dr. S. J. Meltzer, Dr. E. A. Spitzka, Mr. W. C. L. Eglin, Dr. E. A. Kennelly, Mr. W. D. Weaver, and Dr. Elihu Thompson.
Copies of this chart may be obtained on application to the Director of the Bureau of Mines, Washington, D. C.

Don't Wait For an Accident. Learn How to Revive Your Partner by Practicing on Him Now, and Let Him Practice on You.

NEW CHART ON RESUSCITATION

The Bureau of Mines has just issued a chart on the subject of resuscitation from gas asphyxiation, drowning and electric shock. This chart is suitable for posting at the mines, in police and fire stations, bathing houses, and all industrial establishments in which there is danger from gas asphyxiation, drowning or electric shock.

This chart shown the Schaefer, or prone, pressure method of artificial respiration, which is the latest and most approved method advocated by eminent physiologists of the country.

The bureau is issuing this chart in the hope of inducing the adoption of this standard method of resuscitation throughout the country and with the hope that the instructions presented on the chart may result in the saving of human life.

Copies of this chart will be sent free of charge to all persons requesting it as long as the edition remains in stock.

EXTENSION OF STAVANGER ELECTRO-STEEL WORKS

Engineers of the West who have been following with close attention the increased activity in electrochemical development on the Pacific Coast will note with unusual interest recent progress in Norway.

The services of an American expert have been employed to design the new rolling mill that the Stavanger Electro-Steel Works will shortly install. This company has since the new year increased its capital from about $300,000 to over $1,000,000. The company was established in 1913, declared a 7½ per cent dividend in 1915, besides paying up the expenses of organization, and has since prospered to such a degree that the recent expansion was considered advisable.

Most of the company's product sold to date has been in the form of raw blocks. The quality of the steel has found favor. The plan is to double the production by installing electricity in the factory and to turn out a finished product by putting in the rolling mill.

That the company may be quite independent of imported fuel, it has taken over the shares in a power company located near it. This company obtained an 80-year concession in 1900 for the development of the Jorpeland water course. This course when fully developed can deliver 12,000 to 14,000 horsepower. Of this, 1600 horsepower are already in use and 5600 are under completion for the steel works.

The new alternators will cost in the neighborhood of $777,200, as follows: Smithpress with rolling mill, electric machinery, buildings, etc., $368,500; electric steel ovens, coupling stations with buildings, connections, etc., electric generators, power transmitters, electric heating ovens, etc., $214,400; extension of laboratory with equipment, $33,500; shares in power company, $93,800; workers' homes, ground and buildings (married workers are to have their own homes), $67,000.

Attempts have been made to get American connections for the purchase of some of the installations.

THE MARVEL OF THE TELEPHONE

BY J. F. GREENAWALT

(Seldom has the romantic side of an engineering development been more interestingly portrayed than in this fine piece of writing. The paper was presented at the 1917 meeting of the New Mexico Electrical Association. The author is associated with the Mountain States Telephone and Telegraph Company at Denver, Colorado.—The Editor.)

The telephone is surrounded by such an atmosphere of mystery and possesses such marvelous powers that it inspires in me a feeling approaching reverence. The tremendous influence which the little instrument has upon human activity fascinates me and holds me in its spell. How does it gather up the sound of my voice, transmit it in silence to a distant point, and there faithfully reproduce it with every accent, every inflection complete? I don't know. The inventor himself doesn't know. Can anything be more mystifying? I place my lips close to a thin metal disc and speak. The metal disc vibrates. An electric current picks up the vibrations and carries them across the city or across the continent, and my friend hears and understands. My part in the operation is simple, my friend's part is not complex, but the part played by the metal disc and the electric current has never yet been written. Mysterious, wonder-working, fascinating it is, and today wholly indispensable in business.

The story of the birth of the telephone in 1876 and its development from a crude contrivance, generally regarded as a toy for the pastime of the rich, into an actual commercial, household and social necessity, reads like a romance as alluring and as wonderful as a chapter out of the Arabian Nights entertainment.

After years of experimentation, during which time he was often hard pressed for funds sufficient to keep him supplied with food, Alexander Graham Bell succeeded in transmitting the sound of the human voice over a wire. It was on March 10, 1876, that the telephone first talked, and it has been talking ever since.

But no child of an inventor's brain ever had a more desperate struggle for existence, and no inventor ever experienced darker days. For eleven years after the telephone first spoke, Bell and his few loyal friends who believed in him and had faith in his invention, endured poverty, struggles, discouragement, ridicule, court wars and battles for commercial recognition. At first scientists were interested only as it presented a new problem for the laboratory; newspapers condemned it; the public made fun of it; the commercial world derided it; and business men would have none of it. Gradually, however, the utility of the telephone intruded itself upon the consciousness of the commercial world, and its popularity grew by leaps and bounds.

It is interesting to note how apparently trifling circumstances sometimes develop into powerful factors in important events; and to note, too, how, often it is wise to act upon a woman's intuition. Bell's experience was a case in point. At the time he was making his experiments, Bell was conducting a "School of Vocal Physiology" in Boston. This was a school for deaf mutes whom he taught what he called "visible speech." One of his pupils was Mabel Hubbard, daughter of Gardiner G. Hubbard, the latter becoming Bell's chief supporter. The teacher lost his heart to this gentle, lovable girl, and some years afterward she became his wife.

Meanwhile, just two months after the telephone had spoken its first word, the Centennial Exposition at Philidelphia was opened. By a fortunate chance Hubbard was one of the Centennial commissioners, and by his influence a small table was placed in the department of education in a narrow space between a stairway and a wall, and here was deposited the first telephone. Bell had no intention of visiting the exposition. He was too poor. He had neither railway fare nor money for hotel bills. But one afternoon his sweetheart was taking the train for Philadelphia. Bell accompanied her to the depot to say good-bye. Here Miss Hubbard learned for the first time that he was not to go. She coaxed, pleaded and wheedled, and finally insisting that for his own sake he must look after his exhibit, she burst into a passion of tears. That settled the question. Bell sprang aboard the moving train and Miss Hubbard loaned him the money for the trip.

This was on Friday. The following Sunday the judges were to examine the exhibits in the educational section. All day Bell waited to demonstrate the telephone. Nearer and nearer came the judges, as the shadows lengthened into the late afternoon. The day was depressingly warm, and just before reaching the corner where the telephone was located, the judges declared they were tired out and would stop the examination for the day. Bell's heart sank and he grew ill with disappointment. But just at this juncture there was a stir in the educational section, Dom Pedro, Emperor of Brazil, accompanied by the Empress, was examining the exhibits. The judges fawned in the presence of royalty. Suddenly the Emperor espied the young inventor seated by the little table in the corner. There was a look of recognition and Dom Pedro hurried to Bell with a cordial greeting. Immediately the attitude of the judges changed. Who was this young man who claimed the friendship of kings? Bell explained his invention. Dom Pedro was interested and insisted on trying it. A spool of wire was unwound and one instrument was taken to a far room in the building. Bell talked and the Emperor heard. The judges talked and listened, while all were fascinated. They forgot the heat—forgot they were tired and hungry and it was not until after 7 o'clock in the evening that the Emperor went on his way and the judges ended their tests. The next morning's papers quoted the judges as saying the telephone was the greatest invention of the great exposition.

Three years before Dom Pedro had visited Bell's school for deaf mutes and had been much interested. Who can say how much the time of recognition of the telephone was advanced by the act of the young woman in insisting that Bell must go to the exposition, and by the happy circumstance of the Emperor's

propitious visit? Certainly it was a happy combination of events.

Notwithstanding that the possibility of transmitting the human voice was now an established fact, there followed another long period of struggle for commercial recognition. Even those who talked over the telephone and listened to the sounds of their friends' voices were skeptical. They suspected a trick. To the scientist and to the laborer alike the thing was incomprehensible. One mechanic insisted that the wire must be hollow. Editors ridiculed the idea of its having any usefulness. The banker said it might do very well for a grocery store but it would never do for a bank. On the other hand, the grocer agreed that it might work in a bank, but it would be useless in a store. Bell alone had sufficient imagination to picture the telephone in general use in the business world. But to all it gave a sort of gruesome feeling. The idea of talking against a disc of metal made them feel foolish, and the fact that the voice could be heard the distance of a city block brought the suspicion that in some way it must be allied with the powers of darkness.

But Bell was persistent. Others became interested. Problems one by one were solved. The switchboard was evolved. Two wires instead of one were found to remove induction. It was discovered that copper would give better transmission than iron, but it was too soft and could not be strung taut enough. Out of this grew the invention of hard-drawn copper wire, one of the most valuable contributions to the science of telephony. And there was born the long distance telephone line, which today is accepted in the most blase manner, as though it had appeared during the first six days and been pronounced good with the balance of creation.

So much for the early days of telephony. Not a decade has passed since its invention that has not witnessed a complete revolution in equipment and methods—not a year has passed that has not marked increased efficiency in the service. But the story is too long.

Today the telephone is so thoroughly woven into the warp and woof of commercial and social life that it would be difficult for the present generation to imagine an existence without this means of communication.

That the telephone is an important factor in business efficiency really admits of no argument. The broader statement may be made that the telephone has increased human efficiency in every channel through which human energy is directed. It has multiplied man's capacity for work and has extended his every faculty far beyond the circle which formerly circumscribed human effort. And this efficiency comes through binding people and communities together in a co-ordinated mass, making possible a co-operation such as was impossible before the advent of the telephone. Without means of instant communication, co-operation is impossible. Someone has said that those inventions which have bridged distances have done most for the human race. The telephone does even more than bridge distances—it absolutely annihilates space. It converts a state into a neighborhood, and a city becomes a household.

As an example of how closely the people of a state are united by telephone, let me recite an instance: At the time of the great San Francisco disaster, the governor of Massachusetts wished to secure the co-operation of the mayors of the different municipalities in the state in raising a relief fund for the sufferers. The Bell lines were placed at his command. In less than five hours the governor had gotten in touch with the more than 350 mayors and had them working along the lines which he suggested. Such instant co-operation between the people of a state would have been absolutely impossible before the advent of the telephone. Remember that the people of Kentucky waited three weeks before they heard that Madison was elected president.

The great slogan of the American people, and especially of the people of the West is "Do it now." The telephone enables us to live up to that motto.

Ian McLaren says, "No American goes slow if he has a chance of going fast. He doesn't stop to talk if he can talk walking, and he doesn't walk if he can ride." And the canny Scot might have added that in business affairs he neither walks nor rides—he telephones.

Today the man of important and varied interests accomplishes more in a day than his grandfather did in a fortnight. The reason for this is obvious. The grandfather depended upon a very incomplete telegraph system, the slow operation of the postal service, long railroad trips, and the then ubiquitous messenger boy. Today the telephone brings his business associates, his clients or patrons and prospective clients or patrons to the business man's elbow. If a question arises that requires the opinion of another, whether he be a block or a mile or two thousand miles distant, he turns to the telephone and the matter is settled at once.

Is there any question in the matter of bonds, coupons or financial matters of whatever character, the banker employs the telephone. And only forty years ago the banker scorned the idea of using the telephone on business conducted with so much secrecy. The telephone contributes largely to banking efficiency.

The grocer of today without a telephone could no more compete with others in his line than could an expressman driving oxen compete with the motor truck. No more order men going from door to door looking to customers' demands. The man at the telephone does the work of a half dozen men in carts or on bicycles. And yet it isn't so long ago that grocers said the telephone could never be of any use to them. It is safe to say that not a single business transaction is completed today without the use of the telephone entering into it in some way or other. It contributed infinitely to the efficiency of the engineers and superintendents in the building of the Panama Canal. Railroads have adopted it for the dispatching of their trains. At the larger terminals you will find a telephone in the observation car of every first-class train, which is connected up until the moment the train pulls out. The same thing is true in respect to steamships preparing to leave port. The large mines are all equipped with telephone lines connecting the superintendent's office, the shops, the ore houses and the underground work-

ings. From the lowest level of the mine the superintendent can discuss questions that arise with the mine president in a distant city. Likewise the bonanza farmer of the northwest employs the telephone to direct the work of plowing, planting and harvesting his thousands of acres. And by the same token it contributes to the success of the modest market gardener, for it enables him to keep in constant touch with the commission men—there is no more guesswork as to what his morning load should contain. He calls up and knows what is required.

The late E. H. Harriman was noted as a telephone user. It is said of him that on one occasion he raised a hundred million dollars in twenty minutes by using the telephone, and saved the Erie railroad. He had a telephone in every room of his palatial residence, including his private bathroom. Some one said to him, "You let the telephone make a slave of you." He replied, "No, I make a slave of the telephone."

When an accident occurs, the telephone becomes the first aid. In time of sickness the telephone keeps the doctor in touch with the case, and keeps anxious friends advised. It is the best guardian of the home. Night prowlers stand in awe of its powers. In case of fire or other disaster the telephone is the silent messenger that summons assistance. In the affairs of the heart it is a boon to lovers, and I must admit, in some such cases, it is also the despair of fond parents. It makes and breaks social engagements. It orders the groceries, does the shopping, conveys holiday greetings, and speaks words of comfort to bleeding hearts. It is found in every portion of the globe, from the frozen shores of Labrador to the South Sea Islands, and even in the darkest jungles of Africa. It speaks all languages from Bowery slang to Nipponese.

So intimately has the telephone insinuated itself into the very lives of the people, especially the lives of the American people, that any general cessation of the service or any general impairment of the service would be nothing less than a calamity.

In this connection, may I touch upon a matter that has to do with the public's share in the responsibility with the telephone company in giving adequate and efficient service? The public is interested in the quality of service and fairness of rates. The one question uppermost in the telephone user's mind is: Is the service as good as the company can give and are the rates as low as they ought to be? The average telephone user never asks the question: Are the rates which we pay sufficiently high to enable the company to maintain its plant at a high standard of efficiency, to pay salaries and wages high enough to attract men and women of superior ability, to maintain a proper reserve for deterioration and obsolescence, and in addition, to pay a fair return to the men and women who have invested their money in the business? And if one stops to think about it, the answer to the second question is the answer to the first. For it must be obvious that if the plant and equipment is not properly maintained the service must necessarily suffer; and if the employes are under paid the able and ambitious will seek other fields, leaving the service at the mercy of the less efficient; cheap labor never makes for excellence of a product; and if no provision is made for a fund to take care of the depreciation the plant will some day fall into decay and there will be no means to rebuild it. And in addition to all of these, if there are not sufficient revenues to pay a fair return upon the investment capital will not be attracted, expansion will be impossible, no new plant can be built and eventually the service will be limited to certain circumscribed areas. This all gives a glimpse of a condition far from the ideal.

Whenever the people through their representatives arbitrarily force rates upon any public utility that are not adequate to meet the requirements which I have just outlined, the people themselves will eventually be forced to put up with a service far below the standard; such action renders the utility corporation helpless to give the highest class of service to which under fair rates the public would be entitled.

There was a time, and it was not so very long ago, that public utilities were promoted for the benefit of the promoter alone; generally the stock found its way into the hands of innocent purchasers, and the new owners found themselves confronted with the problem of paying dividends upon large issues of watered stock and generally with an inferior plant with which to make such dividends. That method is now very much out of fashion; and those utilities which were not inclined to voluntarily put their business upon an honest basis have been forced to do so by federal and state regulating bodies which have been created during the past few years. The public, however, has not been chastened to this extent. The fact should not be lost sight of that the public is just as susceptible of wrong notions and of wrong impulses as is any individual, but with no individual responsibility or conscience. It is undoubtedly true that the general public is gradually throwing off its prejudice and suspicion, growing out of misinformation or lack of information concerning large corporations. Corporations are more inclined to inform the public on all matters affecting relations between themselves and the public. Corporations are also more than ever before injecting the human element into the administration of their affairs. They are coming to the realization that merit is a surer and more reliable safeguard to their interests than is political influence. On the whole, the corporations and the people are getting closer together; the public is beginning to realize that there is such a thing as corporation character, and that a corporation can have ideals as well as can the individual. For instance, the corporation which I represent has ideals of construction standards; ideals of service efficiency; and ideals of duty to the public. In many ways we fall short of realizing the ideal, just as individuals fail to live up to the standards which they have set up for themselves.

SUMMARY OF WORK ON THE NATIONAL FORESTS.

During the past fiscal year there were constructed on the National Forests 227 miles of new road, 1975 miles of trails, 2124 miles of telephone line, 89 miles of fire lines, 81 lookout structures, 40 bridges, 222 miles of fence, 545 dwellings, barns and other structures, 17 corrals and 202 water improvements.

THE CONTRACTOR, DEALER, AND CENTRAL STATION

BY O. B. COLDWELL

(The relations that should exist between the electrical contractor and dealer, and the central stations, constitute problems that are of intense interest throughout the West where the merchandising of hydro-electric energy is each day being placed upon a higher plane of commercial development. Here is a splendid paper on this subject by the superintendent of the Portland Railway, Light and Power Company that, coming as it does from such a well-known authority, should command the attention of electrical contractors and dealers throughout the West. The paper was read before the recent convention of the Washington Association of Contractors and Dealers at Spokane.—The Editor.)

The title of this paper seems to intimate that certain definite specifications are to be laid down defining the exact policies to be pursued by the electrical contractor and central station as regards their relations and dealings with each other and the public.

Like most other statements of policy, however, a certain amount of variation and flexibility must be allowed to cover individual and local conditions. What may be an ideal arrangement in the relations between contractor and central station in one city may be found to be entirely inadequate in another, even though it may be of the same size and of approximately the same class as regards business conditions and the nature of the public to be served.

Probably the most predominant factor in the determination of policy as to relations between contractor, dealer and central station is the personnel of the group of men in any particular community who represent these branches of the industry. And this probably applies more particularly to the contractors and dealers than to the central station for the reason that the burden of proof, or rather of accomplishment, necessarily rests primarily with the contractor and dealer.

In other words, it is the local personal element in the business which we must largely consider in working out the details of our relations with each other, rather than such elements as the size of the community or the nature of the industries and homes to be served. This may be considered as fortunate as the personal element of the industry is, to a greater or less degree, within our own control and susceptible to remolding and improvement where found necessary, whereas, our influence over the size and nature of the community served can, at best, be only comparatively small.

As a general proposition, I think I can say that we are all, without question, agreed that co-operation and organized effort between contractor and central station is a thing greatly to be desired by both parties, and a condition which must exist before the industry can reach its fullest development.

Just how this may best be accomplished is, as above stated, largely a local problem in each case, and must be solved by the local management of the central station and of the contractors and dealers.

There is, however, at least one fundamental requirement which is common to any and all local conditions; that is, the real, positive desire on the part of the two elements to "get together" and know and understand each other and each other's problems. While this statement may seem to be rather trite and superfluous, the fact remains that there still exists in some communities a woeful lack of this real desire for co-operation, or at least an apathetic indifference toward its development.

Starting off, however, with the assumption that this desire for co-operation does exist, the next step is to crystallize this desire into organized action. I emphasize "organized" because little can be accomplished in the way of general co-operation without some kind of an organized plan for its accomplishment.

The three Pacific Coast states of Washington, Oregon and California have taken definite and commendable steps in this direction in the organization of their respective State Contractors' and Dealers' Associations and in the close affiliation which already exists between these associations and those corresponding organizations of the central stations in these states; namely, the Northwest Electric Light & Power Association, which includes Washington and Oregon, and the recently formed Pacific Coast Section of the N. E. L. A., which includes California.

As an expression of the attitude of the latter association toward the contractor and dealer, let me quote from the recommedations made by the commercial committee (and subsequently adopted by suitable resolution) at the recent Riverside convention:

"It is the sense of the committee that the member companies of the Pacific Coast Section get solidly behind the dealer and contractor movement, support the California State Association of Contractors and Dealers by helping it to create a fund for handling its work to better advantage, including the employment of a competent field man, and take advantage of the large volume of advertising, both national and local, already in the field, to the end that the central stations of this territory may get the benefit, to the fullest extent, of all elements that go to make up the industry."

"We believe that the member companies will benefit by fuller co-operation with the organization of contractors and dealers, with the thought in mind that in the contractors and dealers the central stations have active and energetic salesmen without the necessity of having these men on their pay rolls. We believe the time will come when the central stations can leave the merchandising subject entirely in the hands of the dealers with such supervision as must naturally be exercised by the central stations to get the best results for all interests."

Similar sentiments have been expressed from time to time by the older organization of the Northwest Electric Light & Power Association.

It, therefore, appears that the states of Washington, Oregon and California are fairly well advanced along the lines of the organization of dealers, contractors and central stations necessary for handling the machinery of real co-operation. In order to obtain the greatest benefit from these organizations, it is essential that periodical local meetings be held, preferably not more than a month apart, wherein both the

central stations' and the contractors' side of the various general and local merchandising and wiring problems can be heard and discussed. It is hardly necessary to point out that a thorough understanding of the other fellow's side of the question is one of the essentials of intelligent co-operation, and these local meetings, held regularly, are perhaps the best means of accomplishing this "get-together" spirit.

Let me quote from some comments made on this point by W. M. Hamilton of the Portland Railway, Light & Power Company:

"It is essential in any city or town where there are electrical contractors and dealers that they have some kind of an association with regular meetings not more than a month apart, and that an official representative of the central station be present at such meetings to exchange ideas with the contractors and to obtain their viewpoint as to the attitude towards their business that they would like to have the central station adopt in matters of detail as well as general policies."

"The regularity of these meetings is essential, although there may be but little business of consequence transacted at some of the meetings, for if they are allowed to become irregular, they will soon cease to be held, due to lack of interest, and the result will be that the contractors and central station will drift apart, to the detriment of the interests of both."

It should always be borne in mind that the central stations' primary aim is:

1st. To build up additional load or new business.

2d. To develop the use of additional energy by existing consumers.

3d. To hold the existing business, and in like manner the dealers' and contractors' primary object is:

1st. To develop and stimulate demand for electrical appliances and equipment.

2d. To maintain a reasonably profitable basis for their distribution and installation.

In other words, the central station's primary and fundamental object is to get and keep on its lines as many current consuming devices as possible, its profits being derived from the operation and use of these current consuming devices. On the other hand, the contractor and dealer is fundamentally concerned with the supply and installation of these current consuming devices, his direct interest in the matter terminating with the satisfactory installation of the equipment. His direct interests, therefore, end just where the direct interests of the central station begin, and the two interests are not fundamentally in competition or parallel with each other. Rather are they in series, and any effort expended in either section of the line to increase the current in that section, will as a natural result of such a connection, increase the current in the other section also, without detracting in any way from the benefits accruing to the first section.

While the two interests are not fundamentally in competition or parallel there has been, and still is in some cases, the unfortunate condition of a comparatively high resistance in the contractor's and dealer's section of the circuit, this resistance taking one or more of the various forms of indifferent merchandising; poor displays of appliances, lack of aggressiveness in wiring campaigns, poor workmanship, usually due to cut-throat competition, etc. To offset this comparatively high resistance, the central station has found it necessary in such cases to go beyond the bounds of its logical section of the circuit and install shunts on the high resistance sections in the form of electric stores and in some cases wiring and supply departments.

Dealers and contractors naturally resent this intrusion on their field and it seems to be the present consensus of opinion among central station men as well as contractors that such intrusion is not justified where the contractors and dealers can clearly demonstrate their ability and willingness to properly handle this end of the game.

There has been and still remains to be done more or less pioneer work in the education of the public to the use of electrical appliances, but the competition imposed by the central station in taking the lead in this work is probably more than offset by the indirect benefits accruing to the dealers later in the form of stimulated demand for wiring and additional appliances.

In this development work, however, the central stations should, and for the most part have protected the dealer by selling appliances at standard list price or at a price which the dealer can meet with a fair margin of profit. One possible exception to this is the electric range, which is a distinct problem in itself and of which more will be said later.

It has been suggested that the central stations confine their merchandising to those devices with an inherently high energy consumption such as the iron, toaster, percolator, heater, etc., leaving the other appliances such as washing machines, sewing machine motors, fans, cigar lighters, and other similar low consumption devices carrying a good merchandise profit to the dealer.

Others recommend that the central station confine its merchandising activities solely to current consuming devices, leaving all supplies such as wire, lamp cord, sockets, fuses, etc., to the dealers.

A modification of both of these plans will probably be found to be most expedient at the present stage of the industry.

In this connection, it is of significance that the progressive gas companies are still actively engaged in the merchandising of gas consuming devices, indicating that in their opinion the dealers have not yet fully qualified to take care of this end of the business.

Mr. S. V. Walton of San Francisco calls our attention to another phase of the electrical merchandising game which should not be overlooked, and which has more or less bearing on the subject of this paper. It is the prominent part now being taken in the sale of electrical appliances by drug stores, furniture stores, novelty stores, hardware stores and department stores. It has recently been discovered in San Francisco that the bulk of the electrical merchandising is being done by such stores, only a comparatively small proportion being handled by the strictly electrical dealer. This, of course, cannot be taken altogether as a reflection on the electrical dealer, as the large department and household goods stores have undoubtedly certain merchandising advantages not to be paralleled by the specialist in any particular line. It does behoove the electrical dealer, however to inject into his business

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OBSOLESCENCE AS AN ELEMENT AFFECTING RATES

BY C. E. GRUNSKY

(Obsolescence is an element that affects the fixing of rates to be charged by public utilities and as a consequence it is a live topic in the West where the subject is now before rate-fixing bodies in several commonwealths of this section. Here is a discussion on this subject that was brought out by the author in the San Francisco Gas and Electric Company's rate-case, now on trial before the Master in Chancery. The author's comments on obsolescence are in the main here reproduced. Due to the widespread interest in this timely subject this contribution should receive wide attention.—The Editor.)

An appliance, machinery or a process of manufacture in use by a public utility may under efficient management at any time be superseded by a better device or process. When this is the case more or less property is usually discarded, which, under the conditions as they prevailed when this property first came into use, should have served for many years longer. Obsolescence has forced its abandonment.

The knowledge that obsolescence may shorten the term of usefulness of a machine or of portions of any plant used in the public service has prompted valuation experts and the rate regulating authorities to attempt estimates of the allowances which should be made in the earnings to cover the prospective abandonment of property due to this cause.

The last word has not been said in the discovery of new forces in nature and their adaptation to human requirements. It is the belief of many engineers, for example, that the internal combustion engine will put the old types of marine engines of ocean freighters on the scrap heap, and yet the older type under gradual development to its present high state of efficiency has maintained itself for more than a hundred years.

The use of oil in place of coal, not alone as a producer of gas but also as fuel in the production of steam, has caused appliances and machinery to be abandoned which would otherwise have continued in service. No one today can be sure which of two extremes is most likely to prove true, whether, for example, the last word has been said in the manufacture of gas and there will be no further abandonment of standard gas making appliances and processes, or whether, due to exhaustion of sources of oil, or due to other causes, there may not be some new substitute for oil or for the gas itself found which will render some of the most modern appliances of the day obsolete in the near future.

Past experiences in the matter of abandonment of property, due to obsolescence, is not a dependable guide to what may happen in the future. In this respect there is a difference between the failures from this cause and those which result from the wear and tear of use and from the somewhat less regular failures through accidents incident to human frailty, fire and similar causes. In the one case the basis for a satisfactory prediction is lacking. In the other the probability of events occurring in the future can be predicated with some confidence upon what has occurred in the past. There is a difference, too, between replacements made as the result of obsolescence and replacements due to failure from other causes. In the case of obsolescence the replacement is made with some device which betters the service—the output costs less, or the service is made more reliable or the quality of the output is improved, while in the case of ordinary replacements or renewals the betterment of service is not a necessary incident.

It is proper to charge the rate-payer with the cost of replacement when property fails from ordinary causes and to let the earnings, therefore, cover a replacement increment during the useful life of any item of property and to base the charge on the ordinary replacement requirement as determined for such property. Not so, however, in the case of obsolescence. This will be made plain by the following considerations.

There would be no obsolescence if the improved machinery or the new process which takes the place of that which is being replaced did not result in some advantage to some one. If the obsolete property were treated as though its failure had been correctly foreseen and as though funds for its replacement had already been collected from the rate-payers and if the owner had not in fact collected sufficient funds, and if thereupon the remaining value of the obsolete property or the capital investment at which it was carried in the rate-base were immediately ignored, and rates were established as though the abandoned proper had never been in use, the rate-payer would at once get the full benefit of the innovation and the owner would have made a sacrifice of capital which he could perhaps have avoided by being a less efficient manager and holding to the older, less efficient plan of operation. Let it be known that the usual procedure will be to forecast failures by obsolescence and to amortize the capital in such properties on the basis of assumed average conditions which means inadequate amortization in many cases, and there will no longer be any inducement to the owner to improve the efficiency of his plant. He will conclude that it will be safest not to use new inventions or to introduce new processes so long as a sacrifice of capital is thereby involved. He might, in making an innovation, find that he had on his hands abandoned property, the cost of which has not only not been fully returned to him but concerning the further amortization of which the established rules of rate regulating bodies may give no adequate assurance.

It seems self-evident that when the introduction of a new invention, whether the same applies to a machine or to a process, reduces the cost of operation, the resulting advantage should go to both the owner of the utility and the rate-payer. But it is also true that in such event there will be no hardship imposed on the rate-payer if the benefit of reduced cost of producing the output does not come to him immediately. A reasonable procedure would therefore be, in all such cases, to allow the rates to remain as they would have been without the new process, unless a reduction would result in increased demand and greater net profit to the owner, at least long enough to amortize so much of the original plant as is thereby rendered useless and, thereafter, to so adjust rates that, for a suitable period of time, the benefit of the reduced cost will be shared on a fair basis by the owner and the rate-payer. Any treatment less favorable

to the owner of a public utility would discourage the introduction of innovations if they involve further investment of capital and would make for inefficient rather than for efficient management. The owner must not be expected to consent to an increase of hazard without an increase of profit.

The practice of attempting to foresee obsolescence and of burdening the rate-payer before the failure by obsolescence with the charge that is necessary to amortize the capital which obsolescence renders useless, is not alone unwise but unjust. It is not fair to the rate-payer because those who pay rates before the betterment is made should not be made to pay for the advantage which will come to those who pay rates after the betterment has been made; it is not fair to the owner because while apparently increasing his earnings it will act, as do all high charges for service, as a deterrent upon the extension of business and because there will be cases where by error in the estimate of time allowance for obsolescence the owner will be called upon to make a sacrifice when due to obsolescence property is abandoned, which can not be offset against the advantage that may come to the owners of other utilities who benefit by an allowance for something which, in their case, never happens. The obsolescence will, in many cases, occur before any adequate provision has, in fact, been made.

To illustrate the problem which is presented when one type of machinery is replaced by a better type, let it be assumed that the machinery of an old style generating station has been replaced by steam turbo generators, that the old machinery had been in use for some years, that it was still in first class condition but that its abandonment was advisable because, all factors being taken into account, the generation of electric energy will be cheaper with the new installation.

Suppose that the remaining or present value of the abandoned machinery, as a part of the utility, was $200,000 (original cost $250,000 less $50,000 earned replacement), and that $75,000 was realized from its sale after abandonment. Suppose further that an appraisal of the new machinery after its installation shows that it should be introduced into the rate-base at $150,000.

Two cases are possible, either the $50,000 of earned replacement increments have actually been returned to the owner and have reduced the remaining investment from the original $250,000 to $200,000, or the $50,000 are carried in a replacement fund. In the first case on the assumption that only property in use is carried in the rate-base, there would be, after the new machinery is installed, a value to be taken into account reduced by the $200,000 and increased by the cost of the new machinery, that is, $150,000 less the sale value of the old, or $150,000 — $75,000 = $75,000. The result would be a net reduction of present value, as appearing in the rate-base, of $125,000. This amount, on some theory other than "present value," could be retained in the rate-base subject to amortization, or it could be transferred to profit and loss or some other account where it would be carried until together with interest thereon it is completely wiped out. In the seconl case the old machinery would have been carried in the rate-base, at the time of its obsolescence, at $250,000, the original cost, undiminished by accrued depreciation, but this amount would have been offset in part by the $50,000 in the replacement fund. By the transfer of this sum the $250,000 would be reduced to $200,000 and there would then be an addition of the net cost of the new machinery, or $75,000. The rate-base would include on account of both old and new machinery an amount of $275,000, which is $125,000 in excess of what should be in it if original investment in property in use is the determining factor. In either event there will be $125,000 to be either carried indefinitely in the rate-base or to be amortized within a reasonable time.

Unless the owner felt reasonably certain that the $125,000 would be returned to him in some way, he would not prematurely discard the old machinery. If as a result of the change rates are reduced to a point excluding interest on and amortization of the $125,000 the owner will have made a sacrifice for the benefit of the rate-payer out of all reason. If, however, the rates remain undisturbed for a time, then, during this time the excess of earnings, over operating expenses, will be larger than it had been under the original plan of operation by the amount that the cost of operation has been cut down. This increase of net earnings, perhaps cut down somewhat by voluntary action of the owner, should be used to amortize the $125,000 and interest thereon, and when this is accomplished a reduction in rates would naturally ensue, and the rate-payer would share in the benefit resulting from the reduced cost of operation.

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as many of the modern merchandising methods of these other firms as he can afford, if he hopes to hold even a share of this business. The modern electric appliance is little, if any, different from any other forms of merchandise and must be handled accordingly.

The electric range, in its present state of development, may be considered as a distinct problem in itself.

Electric cooking is now going through the period of demonstration and educational development. We had similar problems only a few years ago in the introduction of electric power applications and only a few years prior to that the introduction of electric lighting. The central stations necessarily bore most of the burden of the pioneer work.

At present costs of manufacture, it offers little, if any, chance for a merchandising profit. and for this reason there should be little or no objection on the part of dealers to allowing the central stations a more or less free hand in its introduction.

Most of the central stations are at the present time satisfied if they can get the range on their lines at bare cost (not including the cost of furnishing service). Even on this basis, the initial cost to the consumer is an obstacle not easily surmounted, and to add a sufficient profit to make the range game attractive to the dealer, would in most cases be suicidal to the chances of getting the range connected.

It would seem, therefore, for the present at least, that the central stations must necessarily carry the bulk of the range business. There is no reason, however, why satisfactory arrangements cannot be made between dealers and the local central station providing for a commission to the dealer from the central station on all ranges sold and installed by him in competition with the cost price offered by the central station.

RECENT ADVANCES IN WESTERN WATER LAW

(Water right adjudication has long been a perplexing question in the West and in many instances the court proceedings have proven so intricate and unsatisfactory as to discourage investment in irrigation and water power development. Here is an important advance in California in the method of adjudicating water rights that, it is believed will vastly simplify procedure and at the same time forward the stability and general confidence of the public. Engineers and others interested in water rights throughout the West will find this article descriptive of the new procedure by the California Water Commission of much timely interest.—The Editor.)

NEW ADVANCES IN WATER RIGHT ADJUDICATION

BY A. E. CHANDLER

Marking a new epoch in legislation pertaining to water rights in California, the State Water Commission is about to undertake its first adjudication since organization in March, 1915. The Stanislaus River watershed has been chosen, on the joint petition of the South San Joaquin and the Oakdale irrigation districts, for the initial work. These two districts comprise 141,000 acres, situated in San Joaquin and Stanislaus counties. The systems are perhaps the most modern in irrigation construction and their combined cost aggregates over $5,000,000. The announcement is perhaps the most important made by the water commission and one of the most important ever made by any public body in the state. It is of state-wide significance as being the commencement of active work in the policy of the new water legislation, which will finally extend to every stream in California. The adjudication procedure is one of the features of the Water Commission Act. That no action was taken on it before, was due principally to the incompleteness of that phase of the law as it was originally enacted. The correction of this at the solicitation of the water commission, was one of the principal acts of the last legislature. It is doubtful if any other official act of recent years has been more far-reaching in its effect both as to the number of people involved and the extent and value of property interests, than this decision of the water commission to proceed with the adjudication of water rights on the streams of the state.

The Stanislaus stream system is important as to irrigation, mining and power. The river is 120 miles in length, from the source of the Middle Fork in Alpine County to its junction with the San Joaquin. Forty miles of this is in the valley. Above the valley, the waershed of the river embraces 950 square miles. Its discharge at Knights Ferry, above Oakdale, Stanislaus County, where the stream emerges from the foothills, is shown by records of the U. S. Geological Survey to average annually enough water to more than cover a million and a half acres a foot deep. The counties of Alpine, Calaveras, Tuolumne, Stanislaus and San Joaquin are embraced in its watershed.

There are two classes of water rights recognized by law on California streams—riparian rights and rights by appropriation. Riparian rights are those which pertain to lands bordering on the banks of a stream, while rights by appropriation are those which pertain to lands which are not directly in contact with the stream, but which by proper procedure have acquired rights to the use of the waters. The newer legislation in water rights favors the doctrine of appropriation as opposed to the riparian doctrine, known as the English common law doctrine. The Water Commission Act makes no provision for adjudicating riparian rights, hence all adjudications must be for rights by appropriation only. The charges for the adjudication are based on a graduated acreage fee. The procedure which has not been publicly expounded before, is therefore of general interest and is summarized as follows:

When the water commission enters upon an adjudication, by any of the three means by which such procedure may be initiated, its engineers and other representatives proceed to a complete examination of the entire stream system, which includes the main stream and all its tributaries, as to flow, conduits diverting water, rights to the waters, use, acreage and all other phases involved. Each claimant to water is required to furnish proof of his appropriation in detail, for the establishment of his claim. When these proofs are all in, a transcript of them is made and printed and a copy sent to each claimant so that he may be informed of the claims of every other claimant. All the original documents thus submitted, together with all maps surveys and data gathered by the commission are then, after due notice, thrown open to public inspection at convenient places designated by the commission. Following inspection, contests may be entered by any against the proofs of appropriation. Such contests are heard by the commission. Following this procedure, it is the duty of the commission to decide upon the relative rights of all the claimants to the use of water of the stream system. This decision is known as a "determination." The determination is immediately filed with the Superior Court, which makes an order fixing a time for hearing same, at which time any claimant dissatisfied may take exception.

In case no exception is filed, the court must enter a decree confirming the determination of the commission. Should exception be taken, the court proceeds to a hearing of the case, as in civil matters, at which further evidence and data may be received. Finally the court enters a decree either confirming or modifying the decision of the water commission. This final decree is termed the "adjudication," and is conclusive as against all but an appeal to the Supreme Court. It specifies and settles the rights of each claimant as to his priority, amount, purpose of use, place of use, point of diversion and if for irrigation, the specific land to which the water is appurtenant, together with such other conditions as may be necessary to define the right. The water rights are recorded and the water commission

issues each claimant a certificate as evidence of his right as adjudicated.

The proposed adjudication will settle many long standing disputes, which have made water rights in California so uncertain and insecure and will do much to clearing off a complex condition in all sections of the state. The work on the first adjudication is to be commenced immediately.

ELECTRO-CULTURE

(Interesting data have been compiled on the increasing of crop production by electro-culture. The fertility of soils in the West has always been so favorable for giant yields that little attention has been paid toward forcing additional production. Electro-culture should, nevertheless, receive wide appreciation in the West, where abundant power is available. The data published herein is presented to our readers through the courtesy of the Electrical Review of London and the Electrical News of Toronto.—The Editor.)

The method of distributing the charge to the crops as carried out at various experimental points in Great Britain has been much the same. A network of wire, or strands, barbed or plain, were stretched over the crops at a convenient height from the ground by means of high tension insulators and kept charged to a potential of about 80,00 to 100,000 volts. As network is generally inconvenient and expensive and barbed wire involves the use of heavy poles and large insulators, the choice usually falls on the plain wire. The density of an electric charge at any point on its body is proportional to the curvature at that point. That is, the potential would be greater as the curve is greater, and, therefore, the wires should have as small a diameter as possible. Wires of from 20 to 30 s.w.g. maintained at 90,000 volts appear to give the best results. This is just about the pressure at which corona appears and so, at this potential, it is possible to transmit, if necessary, without much energy loss so that all leads to the network may be of bare wire No. 10 or 12 s.w.g.

A network of fine wires may be used in a span of 150 ft. with a sag of not more than 8 to 12 inches if silicium bronze or galvanized steel is used. It is better to keep the wires as low as possible, thereby intensifying the discharge. However, to avoid concentration on some plants which are higher than others, the distance between the wire and the ground should be at least equal to twice the height of the tallest full grown plant. It is also necessary to allow sufficient space for working under the wires, so that it would appear that a distance of 7 ft. from the ground is about the minimum.

Three methods are in use for producing the high tension current with which the network of wires is charged: (1) static machines; (2) step-up transformers; and (3) induction coils. Of these, the coil seems to be open to the fewest objections. Wireless and X-ray work have produced so great a demand for these machines that they have now become thoroughly reliable and are available at a moderate cost.

According to the Electrical Review, the discharge appears to act, roughly speaking, as artificial sunlight, and, as it is quite possible to over-stimulate plants, judgment is necessary in determining how long to keep the discharge going each day. In damp, cloudy weather four or five hours per day would appear to be about right; a sunny day would require less, while in hot scorching sunlight, or in periods of very dry weather the discharge should be discontinued altogether. It will thus be seen that this method of culture appears to supply a means of counteracting lack of sunlight—a condition experienced, for example, at many points in Canada during the months of May and June of the last two years. Another useful effect of the electric discharge is that blight and insects appear to be destroyed. It is said that these are quickly cleaned from such things as beans and carnations, and so on, when attacked.

Morning and evening are the best times of application, particularly the morning, and, as the crops under this treatment draw more from the soil, both in moisture and food, it is necessary to supply more water and fertilizer.

A TYPICAL INSTANCE OF UNDERGROUND WATER SUPPLY

In recent years the electrically operated pump has found wide application throughout the West in pumping water for irrigation from underground sources. A typical study of underground water supply has recently been completed by the U. S. Geological Survey.

Luna County, in southern New Mexico, is not rich in metallic minerals, but parts of the county are underlain at no great depth by waters which are of great value for irrigation. These waters are now used extensively, and when they are fully utilized their products will be of great value. In the Deming folio of the Geologic Atlas of the United States, now being issued by the United States Geological Survey, Department of the Interior, Geologist N. H. Darton gives a description of the greater part of Luna County. He shows that although the area underlain by water is wide and long, it has its limits and homesteaders taking land outside of the favored district will be disappointed in their water supply. In this publication many facts are given as to depth of wells, volume of water available, and other important details as to water resources. The water-bearing beds are 20 to 50 ft. thick and consist of gravels and sands deposited by Mimbres River, mostly lying from 20 to 200 ft. below the surface. They underlie about 500 square miles of country, and it is estimated that in this area there is sufficient water to cover 2,500,000 acres to a depth of 1 ft. This supply will bear considerable draft, but as the source of the water is not unlimited crowding of pumping plants would in time seriously deplete the supply. There are in the area about 300 wells now being pumped, and the many acres under irrigation are yielding good crops of forage and vegetables. Accordingly the region is prospering, and Deming has developed into a town of considerable importance.

It is estimated that there are four million and a quarter automobiles in the world, of which number three million and a half are located in the United States. What a saving in fuel will be accomplished when these all become electrically operated!

SUGGESTIONS FOR CONTRACTOR AND DEALER

DEPARTMENT CONDUCTED BY GEORGE A SCHNEIDER

(The question of repair parts and how to properly handle orders for them often proves a perplexing problem in the every day life of the electrical contractor and dealer. This question and other discussions of equal interest and importance are treated in this issue in the following lines. This department is conducted by the power apparatus specialist of a well-known electrical supply house in San Francisco and the matter herein treated is taken from questions that daily arise in the progress of the art. Contractors and dealers having problems to solve that are proving troublesome in solution are urged to send them in to the editor and they will be answered in this department.—The Editor.)

HANDLING REPAIR PART ORDERS

There is probably no other class of orders which the electrical dealer or contractor is called upon to handle that give so many chances for dissatisfaction on the part of their customers as those covering replacing parts required in connection with repair jobs. Repair parts are seldom ordered until needed and then are generally wanted in a great hurry. In these times when deliveries are poor there is ample opportunity for delay and misunderstanding if such orders are not carefully handled.

An analysis of any considerable number of repair part orders will show that in a large percentage of the cases the principal cause of delay and trouble is the fact that complete information covering the parts needed and the device or machine for which the parts are required is not given or at least is not accurately given.

A similar study of the reasons why complete information is not always given brings forth some interesting facts that ought to interest all who are called upon in any way to handle these orders. Among them we find that very often it is difficult to give a description of the part wanted or in some cases the wrong descriptive term is applied. Again the name plates identifying the device or apparatus have been removed or changed and in ordering parts some dealers endeavor to use the data applying to a machine which they think is identical but which later proves to have been different in minor details. Many mistakes also result from errors in copying the serial numbers. Very often these numbers and other necessary information are not given because the device is some distance from the dealer and he tries to order by simply giving a brief description of the apparatus. Such instances are almost daily occurrences in connection with orders for motor repair parts. Further, many manufacturers do not issue repair part catalogs or do not sufficiently identify their apparatus to permit extra parts being ordered intelligently.

Decided improvement along these lines, however, is now noticeable and many manufacturers are taking the necessary steps to issue repair part catalogs or to otherwise incorporate the information needed to order parts for apparatus of their manufacture in their instruction books or other descriptive literature. To further assist along these lines one manufacturer has adopted the practice of either giving the catalog number of the parts most frequently ordered or in specifying the number of the part catalog or bulletin in which the parts for the device are illustrated and listed. This is done by means of a small brass name plate, in addition to the regular rating plate, attached to the device.

Many other manufacturers seem to be adopting equivalent means of better identifying their goods and the principal repair parts needed. All of these precautions are indeed helpful and if used as intended will save a great deal of delay and money and many misunderstandings as well.

This question in general is a broad one and it would not be at all difficult to write a lengthy article on the subject. The space available does not permit of this but the writer believes the following condensed suggestions if followed will materially assist in decreasing the delays, troubles and unnecessary expense incident to the handling of such orders.

(a) Specify clearly the names of the parts wanted and the device or machine for which the parts are intended. If the machine carries one or more plates give all of the data from each plate, also any numbers that can be found on the parts needed.

(b) Specify the number of parts required. Don't simply say "one set" or the like.

(c) Always state if the parts are urgently needed and if the parts are to be ordered by telegraph. At the same time remember that often the profit on the transaction will be less than the cost of the telegram. Manufacturers should not be expected to stand the cost of such telegrams. Inform your customer of these facts.

(d) Always give shipping instructions and state whether parts shall be forwarded by express, parcel post or freight. Specify carefully whether or not the carrier charges are to be prepaid or not. Always estimate the weight of the shipment and the charges involved before instructing how shipment shall come forward.

(e) Don't make promises of delivery on parts unless you have definite information from the manufacturer or supplier.

(f) Don't quote prices for parts unless you have a quotation or similar information from the supplier upon which you can base your estimate. Remember repair parts as well as the finished product have advanced considerably during the past two years. In fact, on account of factory conditions some manufacturers will not supply parts for very old apparatus under any condition.

(g) Don't order parts by giving information from some other device of the same manufacturer that seems to be identical with the device for which the parts are actually wanted. There may be minor changes that will prevent the parts being used interchangeably.

(h) By all means do not promise your customer that you will get the parts from the manufacturer without charge unless you are fully conversant with the guarantee covering such apparatus, the time it has been in use and other similar facts. It pays to withhold all comment regarding such questions until you are sure of your ground.

NOTES ON CURRENT AND POTENTIAL TRANSFORMERS

Current and potential transformers, or instrument transformers as they are commonly named, are required in connection with most installations of alternating current switchboard instruments and in some cases with portable instruments. They are also used extensively with other devices such as voltage regulators, relays, oil circuit breakers, and starting and protective devices.

There are several reasons why instrument transformers are so extensively used. The most important are:

(a) It is not always practical to construct electrical instruments or similar apparatus of sufficient capacity to be connected directly with circuits in which either the voltage or current exceeds a certain limit.

(b) For the general safety of the operators it is necessary to keep high tension circuits away from switchboards or similar control apparatus which is frequently handled.

(c) It is sometimes cheaper to use instrument transformers than to design apparatus suitable for connecting directly with the circuits.

(d) By adding the necessary current or potential transformers instruments already in service may occasionally be adapted to other circuits where otherwise they would not be satisfactory.

The design and manufacture of these types of transformers must be carried to a far greater degree of refinement than is necessary in the ordinary lighting or power types because the accuracy of any instrument or group of instruments connected to a transformer is affected by the operating characteristics of the transformers.

One manufacturing concern has taken advantage of these possibilities and now offers two distinct lines of current and potential transformers. One line includes the standard current and potential transformers suitable for any class of service. The other line consists of a limited number of types for use only with those devices that do not require a transformer of the highest accuracy.

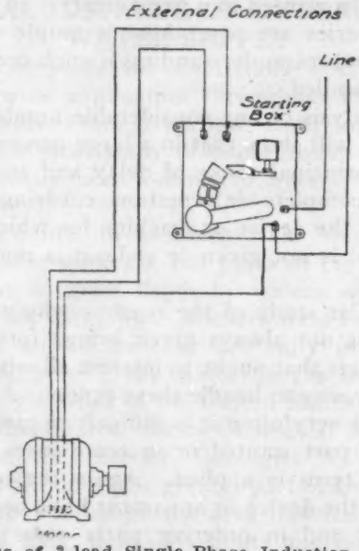
To distinguish between the two types of potential transformers the less accurate and lower price types are known as voltage transformers. They are made for use on circuits of 2500 volts or less and are used extensively in connection with the low-voltage coils of protective and controlling devices such as oil circuit breakers or starting compensators. Corresponding current transformers are made in sizes up to about 800 amperes and for circuits of 2500 volts or less. They are designed especially for use with automatic circuit breakers either separately or in connection with suitable relays. They can also be used with ammeters when the highest accuracy is not essential but should not be used with other types of instruments.

The substitution of these special types of transformers may often effect a considerable saving.

REPLACING 6-LEAD SINGLE-PHASE STARTERS

It is not generally understood among many who are engaged in handling motors in one way or another that the CR-1027 resistance-reactance starters now in the market for use with a certain line of single-phase induction motors can be used in most cases with the early type 6-lead single-phase motors which were sold quite extensively some years ago.

In general appearance these motors were similar to the line of small polyphase motors built by the same manufacturer, in fact the same general lines of frames were used. The stator windings were practically the same as those of a standard three-phase motor but both leads of each phase were brought out, making a total of six. The starters for these motors consisted of a triple pole double throw knife switch with several extra contacts and a resistance and reactance coil for producing the necessary phase displacement in the windings during the starting period. Six leads were brought out from the starters to correspond with the six motor leads. A spring was provided to prevent the switch lever from being left in the starting position. The connections were such that during the starting period the windings were Y connected, with



Connections of 3-lead Single-Phase Induction Motor with CR-1021 Starter

the resistance and reactance coils connected across the line and in parallel with the motor windings. In the running position the motor windings were connected in delta and the resistance-reactance coils were disconnected from the motor windings.

The connections of the CR-1027 starter used with the later type 3-lead resistance-reactance starting single-phase motors are shown in the accompanying figure. When using this type of starter with the old 6-lead motors it is only necessary to connect leads 1 and 2, 3 and 4, and 5 and 6 together, then consider them as three leads only and connect as shown in this diagram. With these new type starters the motor would start and run delta connected and the resistance and reactance coils would be in series with the motor during the starting period. These starters have low-voltage release which is an improvement over the old 6-lead starters which were not so equipped.

When using the later type starters, the starting torque of the motor may be slightly changed and in some cases these starters may not be found satisfactory. Generally speaking, however, they will give the same results. It will depend upon the size of motor and the torque required by the load to be handled.

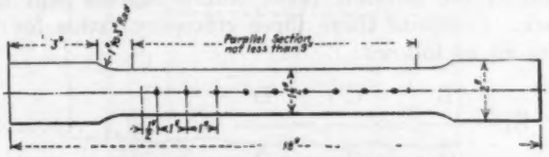
FUEL OIL AND STEAM ENGINEERING

(The increasing number of enactments by state legislative bodies and accident commissions make a study of the underlying principles of boiler inspection in fuel oil practice a matter of great importance. In the last discussion the authors set forth the standard books or authorities on this subject, briefly explaining the value of each, herein is given a short discussion of the fundamental tests involved in boiler inspection and finally is set forth a detailed method whereby the strength of rivets and the safe working pressure of the boiler may be ascertained.—The Editor.)

HOW TO COMPUTE STRENGTH OF BOILER SHELLS IN FUEL OIL PRACTICE

BY ROBERT SIBLEY AND CHAS. H. DELANY

In order to ascertain by computation the maximum allowable pressure we must first compute the bursting strength of the solid boiler shell, then find the weakest part of this shell, which, of course, will give us



STANDARD FORM OF TEST SPECIMEN

In order to thoroughly test out plate material for boilers, a form of standard specimen has been established by the Boiler Code Committee of the American Society of Mechanical Engineers. The above illustration shows the standard form for the tension, cold-bend, and quench-bend test to be made from each boiler plate as rolled.

the point where the shell would really give way. We next compute the steam gage pressure that would cause the boiler to rupture at this weakest point. This is known as the bursting pressure. It is important to note here the difference between the bursting pressure of the boiler and the bursting strength of the boiler shell. The former indicates the reading of the steam gage at which the bursting will take place while the latter indicates the unit internal pressure in the boiler material when rupture occurs.

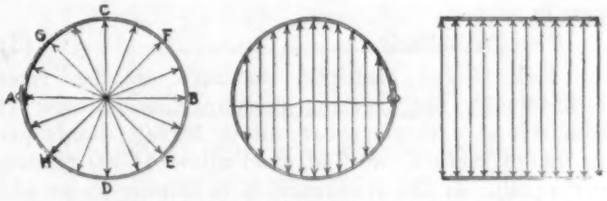
As a working gage pressure for boiler operation a factor of safety of 5 is often used—that is, a gage pressure 1/5 that of the bursting pressure is considered as the largest gage pressure that may be safely put upon the boiler. It should be noted that when considering the safety of a boiler we always deal with gage pressure and not absolute pressure. The bursting pressure of a boiler is the difference between the pressure inside the boiler and the pressure outside, when rupture would occur, and as the latter is always the pressure of the atmosphere the bursting pressure must be the amount the inside pressure would be above the atmospheric pressure, which is the same thing as gage pressure.

In order to ascertain the breaking strength of boiler material, a sample known as a standard form is put to test. Experimentally it has been found that whether a piece of material is subjected to rupture by tension, compression, or shear, the unit force required to rupture a square inch section, is equal to the total force observed in rupturing the specimen in each particular case divided by the cross-sectional area. This fundamental law enters largely in computation of boiler strength. Let us then proceed to this analysis.

The Strength of the Solid Plate.—In the study of gases and vapors it has been experimentally established that the pressures exerted by such substances are felt equally in all directions at any given point under consideration. Let us then consider the most disastrous direction for pressure action. This evidently would be in such a direction as would tend to tear the boiler shell apart. If the length of shell considered be of length p equal to the distance from center to center of the riveted section or what is known as the pitch of the rivets, we have for a boiler of thickness t a resisting area of pt square inches. If the solid shell will not burst until each square inch of area has upon it a unit force of S_t pounds, the total resistive force according to the experimental law stated in the previous paragraph is evidently pt S_t. Hence if A is the strength of solid plate, we have

$$A = tpS_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Rule I. Multiply the thickness of the plate by the pitch of the rivets and by the tensile strength of the plate. The result is equal to the strength of solid plate.



A DIAGRAMATIC REPRESENTATION OF INTERNAL BOILER PRESSURE

Since the pressure of a vapor is exerted equally in all directions we should consider that direction which would produce the most active results in tearing apart a boiler when deducing expressions for the safe working preasure. In order to ascertain the total pressure tending to burst the riveted section shown in the middle figure above, the pressure should be taken with the direction as shown by the arrows in this figure.

As an illustration, let us compute the strength of the solid plate for a boiler whose thickness of shell is ¼ in., whose spacing of rivets is 1⅝ in., and whose tensile strength stamped upon the boiler plate is found to read 55,000 lb. per sq. in.

Applying Rule I, we have that the strength of solid plate is

$$A = tpS_t = 0.25 \times 1.625 \times 55{,}000 = 22{,}343 \text{ lb.}$$

The Strength of the Net Section.—As in the case of the weakest link determining the strength of the chain, so the strength of the boiler shell is determined by its weakest section. This will evidently be at the point where the shell has been perforated for the insertion of rivets. The actual area that will resist rupture is now no longer pt but since it has been weakened by an area dt wherein d represents the diameter of the rivet hole, B, the net resistive force now becomes

$$B = (pt - dt)\, S_t = (p - d)\, tS_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Rule II (a). From the pitch of the rivet subtract the diameter of the rivet hole, then multiply by the thickness of the plate and again by the tensile strength of the plate. This result is equal to the strength of the plate between rivet holes—in other words to the strength of the net section.

Taking as an illustration the same boiler mentioned in Rule I, we have, if the diameter of the rivet hole is 11/16 in., that the strength of the plate B between rivet holes is

$$B = (p - d)\, tS_t = (1.625 - 0.6875)\ 0.25 \times 55{,}000 = 12{,}890 \text{ lb.}$$

Resistance to Shear.—A boiler may not only fail by bursting apart the actual shell material but the rivet itself may give way. Under pressure the riveted boiler seam may pull apart and cut or shear off the rivet similar to the action that would take place by using a huge pair of shears. The area of cross-section of the rivet is evidently the only opposition that such an action would receive over the distance between one set of rivets in case of a single row of rivets, or if there be n rows of rivets, the area resisting shear is n times that for a single row. Hence, the force that would oppose rupture due to shear is evidently n $(.7854d^2)$ S_s, where S_s is the pounds pressure exerted over each square inch of cross-section under shear. From results shown by tests, average iron rivets will shear at 38,000 lb. per sq. in. in single shear and 76,000 lbs. in double shear; steel rivets at 44,000 lbs. in single shear and 88,000 lbs. in double shear. Hence we have that the resistance to shear C for a riveted section is

$$C = .78554d^2nS_s \qquad (3)$$

Rule II (b). Multiply the area of the rivet $(.7854d^2)$ by the shearing resistance as follows If iron rivets in single shear, allow 38,000 pounds per sq. in. of section, or if of steel allow 44,000 pounds per sq. in. If the resistance is in double shear add 100 per cent to the above. The result is the bursting pressure for shear.

Continuing the example above cited, we have that the shearing strength C of one rivet in single shear is

$$C = n \times .7854d^2S_s = 1 \times .7854 \times .6875^2 \times 44{,}000 = 16{,}332 \text{ lb.}$$

Resistance to Compression.—Again the rivet may be forced to give way by having its longitudinal section (dt) actually crushed if the total crushing force of the steam pressure exceed dtS_c, where S_c is the crushing pressure in lb. per sq. in. over each unit area of the rivet. Hence the resistance to compression D is

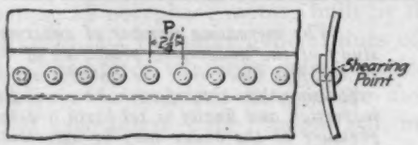
$$D = dtS_c \qquad (4)$$

Rule II (c). Multiply the diameter of the rivet by the thickness of the boiler plate and then multiply by the unit bursting stress for compression for the rivet which is taken at 95,000 lb. per sq. in. The result is equal to the strength of the rivet section for compression.

The resistance to compression D for the example above cited is then

$$D = dtS_c = 0.6875 \times 0.25 \times 95{,}000 = 16{,}328 \text{ lb.}$$

The Efficiency of the Riveted Section.—We now see that the riveted section weakens the solid plate in three ways. In the first place, the boiler may give way more easily because a section equal to the rivet hole has been cut from the solid plate. In the second place, the rivet may be actually sheared in two, and



A SINGLE RIVETED LAP JOINT FOR BOILER PLATES

By taking into consideration the stresses involved in a sectional distance equal to the pitch of the rivets, P, as shown, we are enabled to deduce the safe working gauge pressure for boiler operation.

in the third place, it may be crushed longitudinally. The next thing to do then is to determine the ratio that each one of these factors bears to the strength of the solid plate and adopt the weakest or smallest ratio as the possible point where rupture will take place. Compute these three efficiency ratios for the joint E_j as follows:

$$E_j = \frac{B}{A}, = \frac{C}{A}, = \frac{D}{A} \qquad (5)$$

Rule III. Divide the strength of the weakest section by the strength of the solid plate. (See Rule I). The result is the efficiency of the riveted section.

Thus in the example cited we have seen that the strength of the solid plate is 22,343 lb., that its strength between rivet holes is 12,890 lb., that the shearing strength is 16,332 lb. and that the crushing strength of the plate in front of one rivet is 16,328. Hence, the weakest place is in the strength between rivet holes and consequently the efficiency of joint E_j is

$$E_j = \frac{12{,}890}{22{,}343} = .578.$$

Gage Pressure Necessary to Burst the Solid Boiler Plate.—We come now to the most interesting point of our analysis, namely to compute the bursting pressure of the solid plate.

In the discussion of the strength of the solid boiler plate we found that the force of steam pressure acting so as to tear the boiler plate apart longitudinally would evidently prove most disastrous in bursting the solid boiler plate. Since the pressure of steam exerts itself equally in all direction, we shall compute the total pressure available in this particular direction as this would give us the critical pressure for our present consideration.

If the boiler is of length l inches and inner diameter D inches the area of steam pressure is Dl. Since now the boiler gage pressure is P_s lb. per sq. in., the total pressure of the steam would evidently be P_sDl lb. To resist the boiler tearing apart there is a strip of boiler metal on each side of length l and thickness t. Hence the total metallic area of resistance is 2 lt. If now the force of resistance offered by the metal is S^t lb. per sq. in., we have, when an explosion or bursting apart is about to take place, that this resistive pressure is $2\ ltS_t$.

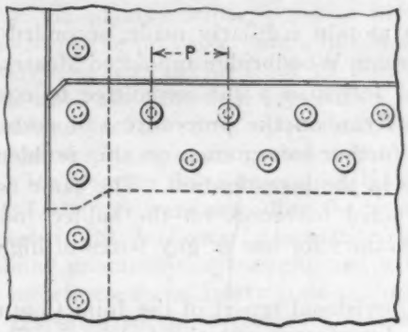
Equating these two pressures, we have

$$P_s D l = 2\,l t S_t$$

$$\text{or } P_s = \frac{2\,t\,S_t}{D} = \frac{tS_t}{D/2} \quad \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Thus we formulate.

Rule IV. Multiply the thickness of the plate by the tensile strength of the plate and divide by the radius (one-half of the diameter). The result is equal to the bursting pressure of the solid plate.



A DOUBLE RIVETED LAP JOINT

By introducing a number of rows of rivets for riveted lap joints the shearing strength and the crushing strength of the riveted section are proportionately increased, while the tensile strength of the net section remains the same.

In the example previously cited we now compute the bursting pressure of the solid shell of the boiler under consideration for a boiler diameter of 36 in. as follows:

$$P_s = \frac{tS_t}{D/2} = \frac{0.25 \times 55{,}000}{36/2} = 764.\ \text{lb.}$$

This means that a gage pressure of 764 lbs. per sq. in. would rupture the given boiler if it existed without a riveted seam.

Bursting Pressure of the Seam.—But our boiler under consideration would evidently burst before the bursting pressure of the solid plate were reached for the riveted section has weakened its total strength. In Rule IV we found that the efficiency of the riveted joint is the ratio of the strength of the weakest point to the strength of the solid plate. Hence we have that the gage pressure P at which the boiler will probably rupture at the riveted joint is

$$P = P_s E_j \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Rule V. Multiply the bursting pressure of the solid plate by the efficiency of the joint. This result is equal to the bursting pressure of the seam.

Thus since the efficiency of the joint E_j is found to be .578 and the bursting pressure P_s of the solid plate to be 764 lb., we have that the bursting pressure P of the joint which is the weakest part of the boiler construction is

$$P = P_s E_j = 764 \times .578 = 442 \text{ lb.}$$

The Safe Working Pressure.—Of course the boiler is never allowed to operate anywhere near this bursting pressure. A factor of safety is insisted upon. The U. S. tables are based upon a factor of safety of 3.5 for drilled holes and 4.20 for punched holes, which are the lowest factors allowed in any civilized country. The factor in most European countries is either 5 or 6. In any case, if factor of safety f is used, we have that the working pressure P_w is found from the formula

$$P_w = \frac{P}{f} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

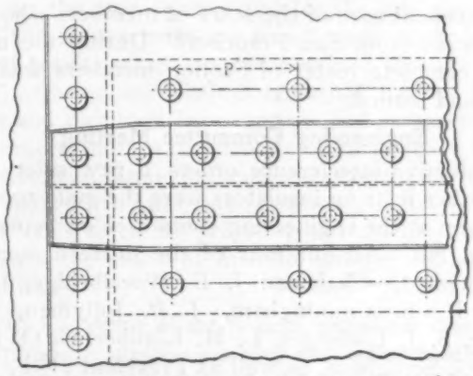
The rule advised by the Hartford Insurance Company's inspectors is as follows:

Rule VI. Divide the bursting pressure of the seam by the following safety factors: 0 to 125 pounds, 4.2; from 125 to 150 pounds, 4.5; 150 pounds or over, 5. The result is the safe working pressure under which the boiler is to operate. The American Society of Mechanical Engineers in their Boiler Code require a factor of safety of 5 for all new boilers.

Thus in the case at issue the safe working pressure P_w becomes

$$P_w = \frac{P}{f} = \frac{442}{4.2} = 105 \text{ lb.}$$

Recapitulating the discussion of the six rules, we now see in its completeness the method involved in computing the safe working pressure of a boiler. In this particular instance we find that a boiler of 36 in. diameter, with ¼ in. plates and a single row of rivets spaced 1⅝ in. apart may safely operate under 105 lb. pressure (gage).



A DOUBLE RIVETED BUTT AND DOUBLE STRAP JOINT

In general the butt joint doubles the shearing strength of the joint while the net tensile strength and the crushing strength of the joint remain the same as in the lap joint discussion.

Example of a Lap Joint, Longitudinal or Circumferential, Double-Riveted.—By similar reasoning we may now compute the efficiency of a lap joint which is double riveted whether longitudinal or circumferential. Thus, if the tensile strength of a boiler is stamped 55,000 lb. per sq. in. with thickness of plate 5/16 in., pitch of rivets 2⅞ in. diameter of rivet hole ¾ in., we have by applying our rules.

$$A = 2.875 \times 0.3125 = 55{,}000 = 49{,}414.$$

$$B = (2.875 - 0.75)\ 0.3125 \times 55{,}000 = 36{,}523.$$

$$C = 2 \times 44{,}000 \times 0.4418 = 38{,}878.$$

$$D = 7 \times 0.75 \times 0.3125 \times 95{,}000 = 44{,}531.$$

$$\therefore E_j = \frac{36{,}523}{49{,}414} = .739$$

ACTIVITIES OF PACIFIC COAST SECTION N. E. L. A.

(The Pacific Coast Section of the National Electric Light Association exists to render service to its members. But, successful rendering of service demands that each individual member do his part. First and most important of these parts is participation in what the association is doing. The association has prepared correspondence courses in salesmanship, electricity and accounting which are given to members only at nominal prices. The Section question box of "Problems and Solutions" is in need of questions and answers for publication in these columns. Each member also should write of how he has overcome some difficulty. Do not leave the work of carrying on the Section solely to the officers, but do your part in making the section activities more active.—The Editor.)

September has been a month of great activity for the Section committees and officers. The engineering committee met at San Francisco September 4 and 5, the executive committee at Los Angeles, September 15th and the commercial committee at San Francisco September 21st, important business being transacted in each case. Chairman J. E. Woodbridge and S. J. Lisberger officially represented the engineering committee at the Spokane meeting of the N. W. Electric Light & Power Association, S. M. Kennedy being there as a representative of the public policy committee. W. M. Deming, master of transportation, arranged for a special car direct to the convention and took excellent care of the score of members who went to Spokane from San Francisco. During the month also a complete roster of Section members was published and mailed.

Engineering Committee Meeting

Inductive interference orders, a new safety code and further tests on insulators were the main topics of discussion at the engineering committee on September 4th and 5th. All but four of the thirteen members were present,—Chairman J. E. Woodbridge, H. A. Barre, R. S. Cunningham, J. P. Jollyman, J. A. Koontz, S. J. Lisberger, L. M. Klauber, C. O. Poole and J. G. Scrugham, as well as President H. F. Jackson and Secretary A. H. Halloran.

President Jackson announced that the California power companies will contribute $500 monthly for such engineering and research work as might be recommended by the engineering committee and approved by the contributing companies.

Chairman Woodbridge reported that a part of the fund of $1500 previously contributed by California power companies for a study of the deterioration of insulators at Stanford University was still available and with a part of the new appropriation might with advantage be devoted to an extension of that work along lines recommended by Professor Harris J. Ryan. This recommendation covers a series of tests of the effects of accelerated cyclic changes in temperature on suspension elements of various makes, both with and without hardware. A discussion of this program indicated that recent improvements in the manufacture of porcelain appear to have eliminated porosity as the cause of insulator failures. The trouble experienced with porcelain of recent manufacture appears to be due to strains set up by thermal expansion and contraction, which strains cause minute cracks, into which moisture subsequently penetrates, resulting in failures.

Upon motion regularly made, seconded and carried, Chairman Woodbridge appointed Messrs. Koontz, Poole and Jollyman a sub-committee to confer with Professor Ryan on the procedure and costs of tests to obtain further information on this problem and to co-operate in the investigation. The same committee was instructed to report on the subject of suitable strain insulators for use in guy wires of high voltage lines.

The provisional report of the Joint Committee on Inductive Interference to the California State Railroad Commission was exhaustively discussed, objections being raised to the provisions regarding the distribution of cost and to the section outlining factors determining the definition of a parallel. The subcommittee was instructed to hold up further action pending advice by the legal departments of the power companies.

The sub-committee previously appointed to draw up recommendations to the California State Railroad Commission on rules to be incorporated in the Overhead Line Safety Code reported on its work to date, including a provisional draft of specifications on loading, safety factors, clearances, and details of construction of power lines with special provisions for crossings. Definite recommendations were adopted.

In order to render practice in the matter of treatment of conflicts and interference between overhead lines more consistent as between the several companies, and to obtain a list of precedents for reference purposes, the members of the committee were instructed to advise the chairman of action taken in all cases of this character.

Further sub-committees were appointed and instructed as follows: Messrs. S. J. Lisberger and L. M. Klauber to draft specifications for the purchase of timber for pole use as a substitute for cedar, with special reference to Douglas fir, including the preservative treatment therefor.

Mr. R. C. Powell was instructed to compile all available pertinent data on the properties of iron wires and cables, applicable to their use as line conductors.

Messrs. Cunningham and Klauber were instructed to recommend standard pintype insulators of the available makes for the practical range of line voltages, with the aim of reducing manufacturers' stocks on the Pacific Coast to a smaller number of types than those made necessary by independent choice.

There being no further business the committee adjourned after a session of one and a half days.

Executive Committee Meeting

An informal meeting of the available members of the executive committee was held September 15th, at Los Angeles. President H. F. Jackson, Vice-President E. R. Davis, Treasurer A. N. Kemp, Secretary A. H. Halloran, R. H. Ballard, Wm. Baurhyte, D. E. Harris, H. C. Reid, K. E. Van Kuran and A. E. Wishon being present.

President Jackson referred to the report of the petroleum committee of the State Council of Defense and then briefly abstracted the treasurer's report, wherein it was noted that the income for the year, exclusive of an advance subscription of $1500, is sufficient to meet the probable outgo, but in view of the close margin it was decided not to return the subscriptions until after the next convention

President Jackson then epitomized the work of the membership, engineering and commercial committees. He reported that Chairman J. E. Woodbridge and S. J. Lisberger were attending the meeting of the Northwest Light & Power Association in order to bring about unanimity of thought and action on inductive interference and safety code problems.

In response to the secretary's request for suggestion as to what additional work the Section should undertake to benefit the membership he was instructed to prepare a circular calling attention to the association's correspondence courses and urging members to write articles of local interest.

President Jackson here introduced a letter from Chairman S. V. Walton of the commercial committee outlining a plan for a co-operative sales campaign in conjunction with the contractor-dealers and the jobbers, this being in accord with a resolution adopted at the Riverside convention. The contractor-dealers and jobbers are in a position to pledge $5000 to start such a campaign and it is hoped that the central stations will assure financial support so as to insure a fund of at least $10,000 to be expended under the direction of a committee consisting of a central station man, jobber and contractor-dealer.

Upon motion by R. H. Ballard the final plans as adopted by the commercial committee will be submitted to the central stations interested and the matter left to their individual action. President Jackson emphasized the fact that the spirit of the resolution should be borne in mind and followed in general even if this particular plan were not adopted. In response to a question by K. E. Van Kuran, D. E. Harris stated that California contractor-dealers during the past six months have sold devices consuming more than 5000 kw.

President Jackson then stated that invitations for holding the next convention had been received from Albuquerque, Santa Rosa and Santa Cruz. He also suggested the possibility of Modesto or Del Monte, while A. E. Wishon suggested Fresno. After a general discussion it was decided to get more suggestions before making final decision. Whereupon the meeting adjourned.

Commercial Committee

Chairman S. V. Walton called a meeting at San Francisco on September 21, J. B. Black, L. H. Newbert, M. L. Scobey, M. S. Orrick, R. M. Alvord, G. B McLean, E. B. Criddle, R. M. Alvord and Secretary A. H. Halloran being present. Chairman Walton explained the purpose of the meeting as being to devise a plan for a co-operative sales, advertising and educational campaign to be handled by the California Association of Electrical Contractors and Dealers, assisted by the electrical jobbers and central stations.

After an extended discussion the committee recommended a definite plan of campaign for the consideration of the two associations affected.

PROBLEMS AND SOLUTIONS

Please furnish recent experience in adopting the system of continuous meter reading. We are about to change from bi-monthly readings and wish suggestions for accomplishing the change smoothly.

What is the load factor, diversity factor and demand factor of electric range installations in connection with house lighting?

In what spirit should public utilities meet municipal overtures to take over local distribution lines?

R. H. Ballard, So. California Edison Co.: I believe best results will be obtained when public utilities meet such municipal overtures in the spirit of co-operation with a view to demonstrating just what is best for the municipality and for the rate payers. As a rule such overtures are based upon misunderstanding of results which may be obtained through municipal operation of local distributing lines. Through calm and thorough investigation and discussion, these misunderstandings can usually be corrected. A refusal to meet with municipal authorities or the maintenance of a biased and antagonistic attitude in such meetings only tends to create prejudice against the utility and increase the stock of misinformation and misunderstanding.

C. 3. What effect is anticipated on current consumption for electric cooking and water heating if the high prices and scarcity of oil and coal continue?

S. M. Kennedy, Southern California Edison Co., Los Angeles: There are so many advantages in connection with the use of electricity for cooking that the pleased consumer with the electric range is the cause of a steadily increasing demand for electric cooking service. This condition is not a theory but a solid fact. With an increase in the prices of all other fuels, the demand for electricity as a fuel should, and will undoubtedly, increase much more rapidly, not only because electricity is stable as to price, but because its utility as a fuel for household cooking and heating purposes has been demonstrated to be practicable and desirable for many reasons which effect the taste, health and pocket book.

The largest electrolytic zinc plant in the world has been built by the Anaconda Copper Mining Company at Great Falls, Montana. This plant has a capacity of 160 to 175 tons of zinc daily. Crediting the value of the recovered silver, gold, lead and copper the cost of production is low enough to compete with the retort process under normal conditions.

Delegates and Guests of the Tenth Annual Convention of the Northwest Electric Light and Power Association and the ond Annua

CONVENTIONS OF ELECTRICAL MEN IN THE NORTHWEST

It was a remarkable gathering of men of the industry that met at Spokane, Washington, during the past two week period. The joint session of the Northwest Electric Light & Power Association with the Washington Association of Electrical Contractors & Dealers proved exceptionally helpful. The strong attendance of manufacturers proved also of unusual profit in that the electric range situation was as a consequence clarified to a degree hitherto unaccomplished in the West.

M. C. OSBORN, President of the Northwest Electric Light & Power Association, who proved himself an able and efficient executive in bringing to a conclusion the most successful and helpful convention in the history of the association.

This Tenth Annual Convention of the Northwest Electric Light & Power Association, which has just concluded its session at Spokane, will go down into the history of the electrical industry in the Northwest as a distinct advance in affairs electrical in that section of the country.

The meeting was called to order by President M. C. Osborn promptly on schedule time Wednesday morning at ten o'clock in the beautiful Hotel Davenport.

The president, in well chosen words, called attention to the serious aspects of the electrical industry in relation to world affairs and asked the convention delegates to rise and sing the Star Spangled Banner as the great flag at the head of the hall was unfurled by two boy scouts appropriately dressed for the occasion.

President Osborn in his address dwelt upon the fact that, due principally to the increased activities of the industry, it was felt by all in position to know, that the central stations, both in the larger cities and in the towns of the Northwest, were on the eve of a long season of unusual prosperity and activity.

There were in attendance at the convention over two hundred and fifty delegates and guests. The second annual convention of the Washington Association of Electrical Contractors & Dealers was also held simultaneously in Spokane. Several of the meetings were joint sessions with the Northwest Electric Light & Power Association.

Perhaps the greatest outstanding feature of the convention was this evident growth in a spirit of get-together between all members of the industry—the central station, the contractor and dealer, the jobber and the manufacturer.

The papers delivered were read as scheduled and previously announced in the technical press.

After conclusion of this preliminary session on Wednesday, September 12, the convention again convened promptly at 2 o'clock in the afternoon, when the reading and discussion of an exhaustive paper on "Practical Central Station Salesmanship," by L. A. McArthur, chairman-editor, assisted by Geo. Bowen, S. H. Hoag, W. H. Line, Lewis A. Lewis, and C. R. Young, took place. This paper clearly defines the field and policy of a power company in the sale of appliances. Emphasis is placed on advertising, appliance value as cost, plans for selling ranges and approved methods of operating an electric store.

J. F. FARQUHAR, Secretary-Treasurer of the Northwest Electric Light & Power Association, whose ability in handling without confusion, the many details incident to the consummation of a successful convention was well demonstrated at the Spokane gathering.

In the discussion W. R. Putnam of the Utah Light & Power Company brought home the neces-

and the ond Annual Convention of the Washington Association of Electrical Contractors and Dealers at Spokane, Washington.

sity of injecting consideration of the "kiddies" into the plans for a sales campaign, as their interest once aroused, he claimed, will add greatly to the gaining of entrance in the home for extended installations of household appliances.

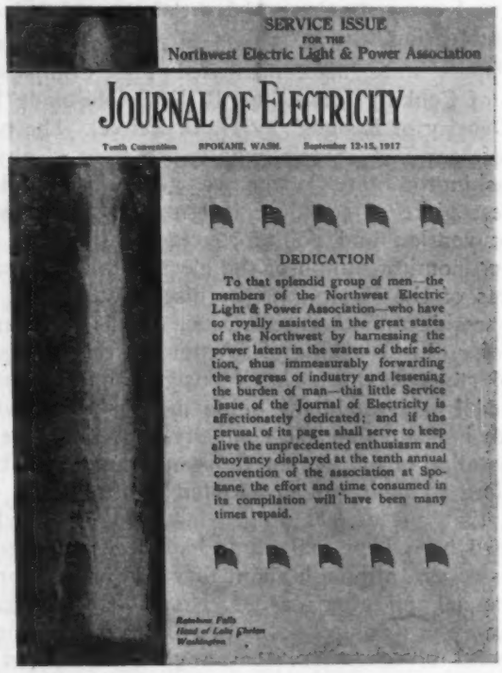
"How the Engineer Can Assist the Commercial Department" was the subject of the session on Thursday morning. This paper, by D. F. Henderson, chairman-editor, and G. L. Duffy, H. C. Henkle, A. S. Hall and L. T. Merwin, is filled with valuable data on the distribution system requirements of various appliances, including ranges and water heaters. Cost figures are a prominent feature. The gist of the arguments is that the engineer's figures of construction costs and his co-operation in reducing them should be the basis of all new business efforts.

The discussion that followed brought out the fact that the cultivation of intimate relations between the commercial and engineering departments is very essential. As one of the members put it, he always invited one of the engineers to go with him when he went fishing instead of a man from his own commercial department. In other words, whether it be called co-ordination or synchronism, the closest co-operation between engineering department and commercial department brings the best results.

On Thursday afternoon A. C. McMicken, H. H. Schoolfield, L. R. Grant, F. O. Boili and Foster Russell presented a paper on "Co-operation in Modern Home and Apartment House Wiring." This shows that in the past no concerted effort has been made to increase the number of baseboard outlets in new houses and apartments. Suggestions are given whereby central stations may secure the co-operation of architects and contractors to this end.

This session, composed also of the delegates to the second annual convention of the Washington Association of Electrical Contractors & Dealers, proved a most lively one. The discussion emphasized that education of the architect to the needs of modern house wiring was not only an excellent thing but Mrs. Cooley, one of the women delegates, most forcefully pointed to the necessity of educating the consumer in the method electrical. This, she claimed could best be brought about by teaching the children in the schools the many uses of electricity.

On Thursday evening F. D. Fagen, Pacific Coast manager of the Edison Lamp Works, gave an illustrated lecture on "Commercial and Residential Illumination." Beautiful slides and moving pictures were


SERVICE ISSUE
FOR THE
Northwest Electric Light & Power Association

JOURNAL OF ELECTRICITY

Tenth Convention SPOKANE, WASH. September 12-15, 1917

DEDICATION

To that splendid group of men—the members of the Northwest Electric Light & Power Association—who have so royally assisted in the great states of the Northwest by harnessing the power latent in the waters of their section, thus immeasurably forwarding the progress of industry and lessening the burden of man—this little Service Issue of the Journal of Electricity is affectionately dedicated; and if the perusal of its pages shall serve to keep alive the unprecedented enthusiasm and buoyancy displayed at the tenth annual convention of the association at Spokane, the effort and time consumed in its compilation will have been many times repaid.

Rainbow Falls
Head of Lake Chelan
Washington

FACSMILE OF THE SERVICE ISSUE OF THE JOURNAL OF ELECTRICITY, distributed gratis for the forwarding of the best interests of the electrical gatherings at Spokane. This little issue of twenty pages, 5 by 7 in. in size and the September issue of the Journal of Electricity, devoted to the papers and discussions of the convention, so won their way into the hearts of those gathered at the convention that the chairman of the convention temporarily called off its discussions in order to fully express the appreciation of the convention members and their guests. In addition to this an enthusiastic vote of appreciation was passed by the convention members themselves and, at the banquet following, the chairman called upon a representative of the Journal for a few remarks stating that the Journal had been the leading factor in bringing about the remarkable success of the gathering.

exhibited by the lecturer which set forth in an interesting and entertaining manner the essential features of correct and artistic illumination.

"The report of the Electric Range Committee," W. R. Putnam, chairman-editor, occupied Friday's sessions, both morning and afternoon. This included the report of several sub-committees—"Merchandising," "Possible Improvements," in burners, ovens and

general design of ranges; "Routine," handling of orders, billing, maintenance and follow-up work; "Commercial Baking and Cooking," including qualifications and compensation; "Advertising" and "Electric Water Heating."

A GROUP OF PROMINENT MEN AT THE SPOKANE CONVENTION. (Reading from left to right): J. F. Farquhar, J. B. Fisken, M. C. Osborn, O. B. Coldwell, P. A. Bertrand, S. J. Lisberger, C. P. Osborne, J. C. Martin, J. E. Woodbridge.

Papers were also presented on "Comparative Tests of Cooking Fuels," by B. L. Steele, and "Bus-Bar Density of Ranges" by H. B. Peirce. The paper of Professor B. L. Steele, who is professor of physics at Washington State College, was generally considered the best piece of scientific information presented at the convention and points conclusively to the ultimate economic triumph of the electric range in many districts of the West. In the discussion, M. C. Osborn, president of the convention, who is commercial agent for the Washington Water Power Company, quoted statistics from the intensive range campaign initiated by his company some months back, which goes to indicate that the company is well in line for the installation of the ten thousand ranges by 1922, according to their slogan adopted at that time. He stated that out of 800 ranges installed, upon which data had been kept, only four had been returned as unsatisfactory, although about fifty had been returned for financial and other reasons. He also stated that his company was absolutely convinced, after many months of careful investigation, that a good electric range property installed, is economically far superior to any other type of range, at least according to conditions prevailing in his territory.

The banquet on Friday evening and the trip to the Bunker-Hill and Sullivan mine on Saturday were participated in by both the power association and by the contractors and dealers. The joint banquet proved to draw out a closer spirit of co-operation for future work, while the trip to the great mine was a real education in the trend of modern electrical application.

The new officers elected for the two organizations for the coming year are as follows:

Guy W. Talbot of the Pacific Light & Power Company, Portland, was the unanimous choice for president of the association at the closing session of the convention. Portland was selected as the city to entertain. Other officers unanimously elected by the convention are: J. S. Thornton, Raymond, vice-president for Washington; W. E. Coman, Portland, vice-president for Oregon; William Wallace, Boise, vice-president for Idaho; J. F. Roche, Butte, vice-president for Montana; J. B. Faulkner, Olympia; George E. Gramb, Wenatchee, and B. A. Bertrand, Aberdeen, members of the executive committee for the three-year term ending 1920. Louis A. McArthur, Portland, and H. L. Waither, Medford, Ore., members of the executive committee, were elected to fill the unexpired terms of Messrs. Davidson and Kinkan.

Convention Registration

Delegates and guests at the Tenth Annual Convention Northwest Electric Light & Power Association, Spokane, September 12-15, 1917:

P. J. Aaron, Fobes Supply Co., Seattle, Wash.
Miss Laura Addison, W. W. P. Co., Spokane, Wash.
R. M. Allen, N. C. Power Co., Seattle, Wash.
R. M. Alvord, G. E. Co., San Francisco, Cal.
H. R. Anderson, W. W. P. Co., Spokane, Wash.
Ross Anderson, W. W. P. Co., Palouse, Wash.
Guy Arthur, W. W. P. Co., Ritzville, Wash.
C. V. Aspinwall, Westinghouse Elec., Seattle, Wash.
Thos. G. Aston, W. W. P. Co., Spokane, Wash.
Lee F. Austin, Austin-McCain Co., Spokane, Wash.
F. N. Averill, Fobes Supply Co., Portland, Ore.
B. P. Bailey, Pacific U. & L. Co., Dallas, Ore.
H. L. Bargion, Mont. Elec. Co., Butte, Mont.
G. W. Barthell, W. W. P. Co., Tekoa, Wash.
Mrs. Geo. Barthell, Tekoa, Wash.
E. C. K. Baughn, P. P. & L. Co., North Yakima, Wash.
T. A. Bayless, G. E. L. & P. Co., Grangeville, Idaho.
G. R. Beckman, W. W. P. Co., Moscow, Idaho.
J. C. Beeckman, W. W. P. Co., Spokane, Wash.
C. E. Beckwith, W. W. P. Co., Sprague, Wash.
Mrs. C. E. Beckwith, Sprague, Wash.
W. S. Berry, Western Elec. Co., San Francisco, Cal.
P. A. Bertrand, Gray Harbor El. Co., Aberdeen, Wash.
T. E. Bibbins, Pac. States Elec. Co., San Francisco, Cal.
H. L. Bleecker, W. W. P. Co., North Yakima, Wash.
Geo. A. Boring, Pac. States Elec. Co., Portland, Ore.
Geo. G. Brown, N. W. Elec. Co., Portland, Ore.
John Bowen, W. W. P. Co., Spokane, Wash.
N. A. Bowers, Elec. World, San Francisco, Cal.
R. M. Boykin, N. Coast Pr. Co., Portland, Ore.
Mrs. R. M. Boykin, Portland, Ore.
M. W. Brickett, W. W. P. Co., Spokane, Wash.
Mrs. M. L. Burgess, W. W. P. Co., Spokane, Wash.
J. A. Byers, W. W. P. Co., Spokane, Wash.
Harry Byrne N. C. E. Co., Seattle, Wash.
R. W. Cabill, Portland Ry., Lt. & Pr. Co., Portland, Ore.
F. A. Correll, S. H. L. & P. Co., Spokane, Wash.
A U. Carlson, W. W. P. Co., Davenport, Wash.
Mrs. A. R. Carlsen, Davenport, Wash.
J. A. Carmichael, W. W. P. Co., Spokane, Wash.
J. M. Chamberlain, Fobes Supply, Portland, Ore.
C. W. Chestnut, West. Elec. Co., Seattle, Wash.
A. M. Chitty, P. S. T. L. & P. Co., Everett, Wash.
W. L. Chrysler, W. W. P. Co., Wilbur, Wash.
R. W. Clark, P. S. T. L. & P. Co., Seattle, Wash.
R. W. Clingerman, North Idaho & Mont. Pr. Co., Tacoma, Wash.
O. O. Coffman, W. W. P. Co., Spokane, Wash.
O. B. Coldwel, P. R. L. & P. Co., Portand, Ore.
J W. Conley, W. W. P. Co., Spokane, Wash.
L. J. Corbett, University of Idaho, Moscow, Idaho
G. S. Covey, W. W. P. Co., Spokane, Wash.
Miss Ann W. Cross, G. E. Co., Missoula, Mont.
J. D. A. Cross, G. E. Co., Pittsfield, Mass.
A. H. Crowell, Wash. Elec. Supply, Spokane, Wash.
W. J. Currie, W. W. P. Co., Spokane, Wash.
Miss Nellie Curtis, G. E. Co., Spokane, Wash.
D. V. Cushman, W. W. P. Co., Colfax, Wash.
R. S. Daniels, W. W. P. Co., Spokane Wash.
W. A Davis, City Hall, Spokane, Wash.
W. M. Deming, Journal of Electricity, San Francisco, Cal.
F. P. Dexter, P. S. L. & P. Co., Seattle, Wash.
Jas. B. Dodge, W. W. P. Co., Spokane, Wash.
J. N. Doherty, W. W. P. Co., Spokane, Wash.
Elmer Dover, H. M. Byllesby Co., Tacoma, Wash.
H. A. Dowe, Marshall-Wells Hardware Co., Spokane, Wash.
G. I. Drennan, P. P. & L. Co., Toppenish, Wash.
R. R. Easter, Hillsboro, Ore.
L. D. Eckard, S. H. L. & P. Co., Spokane, Wash.
Albert H. Elliott, Elliott Hot Air & Gas Co., San Francisco, Cal.
E. Enloe, Okanogan Valley L. & P. Co., Spokane, Wash.
F. D. Fagan, G. E. Co., San Francisco, Cal.
J. F. Farquar, W. W. P. Co., Spokane, Wash.
C. M. Fassett, City Commissioner, Spokane, Wash.
E. L. Ferguson, W. W. P. Co., Spokane, Wash.
H. B. Ferris, S. H. L. & Pr. Co., Spokane, Wash.
J. G. Finey, W. W. J. Co., Spokane, Wash.
J. B. Fisken, W. W. P. Co., Spokane, Wash.
Marguerite Fleming, N. W. Elec. L. Co., Portland, Ore.
F. L. Fowler, Arthur S. Fowler Co., Ritzville, Wash.
W. F. Garby, Auto. Elec. Faucet Co., San Francisco, Cal.
S. E. Gates, G. E. Co., Spokane, Wash.
C. G. Gilster, Wash. Elec. Supply Co., Spokane, Wash.
B. C. Grant, W. W. P. Co., Garfield, Wash.
Henry L. Gray, C. E., Seattle, Wash.
John L. Gray, W. W. P. Co., Spokane, Wash.
Robert Gray, W. W. P. Co., Colfax, Wash.
Mrs. Robert. Gray, Colfax, Wash.
W. J. Grambe, P. S. L. & P. Co., Seattle, Wash.
V. H. Greisser, W. W. P. Co., Spokane, Wash.

E. Gump, W. W. P. Co., Lind, Wash.
George Harding, Spokane, Wash.
F. A. Harman, Eastern Ore. Lt. & Pr. Co., Baker, Ore.
Mrs. F. A. Harman, Baker, Ore.
L. V. Harper, Chelan Elec. Co., Chelan, Wash.
P. Hayward, W. W. P. Co., Spokane, Wash.
D. F. Henderson, W. W. P. Co., Spokane, Wash.
S. G. Hepler, Arrow El. Co., Seattle, Wash.
Milt Herrock, E. Pittsburg, Pa.
J. H. Hole, W. W. P. Co., Spokane, Wash.
T. E. Holsey, W. W. P. Co., Spokane, Wash.
G. H. Hoppin, W. W. P. Co., Spokane, Wash.
Harold Hudson, W. W. P. Co., Moscow, Idaho.
Geo. A. Hughes, Hughes El. Co., Chicago, Ill.
Mrs. Geo. A. Hughes, Chicago, Ill.
Earl R. Hunt, W. W. P. Co., Spokane, Wash.
W. F. Hynes, G. E. Co., Portland, Ore.
A. F. Irwin, W. W. P. Co., Spokane, Wash.
J. B. Ingersoll, S. H. L. & P. Co., Spokane, Wash.
R. L. Jacobs, W. W. P. Co., Spokane, Wash.
A. H. Jaeger, Hotpoint Elec. Co., Seattle, Wash.
John J. Jennings, W. I. W. L. Po. Co., Lewiston, Idaho.
Mrs. John J. Jennings, Lewiston, Idaho.
W. H. John, S. H. L. & Pr. Co., Spokane, Wash.
W. E. Jones, Economy Fuse & Mfg. Co., Seattle Wash.
T. R. Jump, Elec. Sales Service Co., San Francisco, Cal.
N. A. Kemmish, Spokane Service Co., Spokane, Wash.
Ludwig Kemper, S. H. L. & Po. Co., Spokane, Wash.
Mrs. Ludwig Kemper, Spokane, Wash.
Mrs. S. M. Kennedy, Los Angeles, Cal.
S. M. Kennedy, So. Cal. Edison Co., Los Angeles, Cal.
Blaine L. Kerns, Westinghouse El. & Mfg. Co., Seattle, Wash.
J. F. Kinder, Elec. Co., Portland, Ore.
L. W. Kingsbury, W. W. P. Co., Pullman, Wash.
G. A. Kumler, G. E. Co., Portland, Ore.
Mrs. G. A. Kumler, G. E. Co., Portland, Ore.
L. C. Lamont West. Elec. & Mfg. Co., Butte, Mont.
A. D. Leach, N. W. Elec. Co., Portland, Ore.
L. A. Lewis, W. W. P. Co., Spokane, Wash.
J. D. Lewis, W. W. P. Co., Palouse, Wash.
S. J. Lisberger, Pac. Gas & Elec. Co., San Francisco, Cal.
G. D. Longmuir, West, Elec. Co., Seattle, Wash.
C. A. Lund, W. W. P. Co., Spokane, Wash.
V. E. McCain, W. W. P. Co., Colfax, Wash.
N. W. Macduff, P. P. & L. Co., North Yakima, Wash.
H. H. Many, Baker-Joslyn Co., Seattle, Wash.
B. F. Marsh, W. W. P. Co., Spokane, Wash.
Geo. J. Marsh, Marshall-Wells Hardware Co., Spokane, Wash.
J. C. Martin, P. P. L. & P. Co., Portland, Ore.
W. J. Martin, W. W. P. Co., Harrington, Wash.
A. M. P. Maschmeyer, Hughes Elec. Co., Portland, Ore.
B. M. Merrill W. W. P. Co., Spokane, Wash.
C. W. Miller, W. W. P. Co., Spokane, Wash.
M. T. Miller, W. W. P. Co., Spokane, Wash.
Chas. R. Mitchell, W. W. P. Co., Spokane, Wash.
S. E. Mitchell, G. E. Co., Seattle, Wash.
A. S. Moody, G. E. Co., Portland, Ore.
L. E. Morse, W. W. P. Co., Spokane, Wash.
J. W. Moss, W. W. P. Co., Spokane, Wash.
R. F. Monges, City Trans. Co., Rep. G. E. Co., Portland, Ore.
Austin Morey, Lewiston, Idaho.
Mrs. Austin Morey, Lewiston, Idaho.
Geo. B. Muldaur, Field Sec. N. E. L. A., New York, N. Y.
G. C. Mundslay, Nat. Carbon Co., Seattle, Wash.
E. M. Murphy, Westinghouse Mfg. Co., Spokane, Wash.
F. H. Murphy, Portland Ry., Lt. & Pr. Co., Portland, Ore.
C. S. MacCalla, W. W. P. Co., Spokane, Wash.
W. B. MacDonald, Mont. L. & P. Co., Kalispell, Mont.
Lewis A. McArthur, Pac. P. & L. Co., Portland, Ore.
Mahlon McCain, Austin-McCain Co., Spokane, Wash.
W. D. McDonald, Westinghouse Elec. Co., Seattle, Wash.
Mrs. W. D. McDonald, Seattle, Wash.
R. B. McElroy, W. W. P. Co., Spokane, Wash.
A. C. McMicken, P. R. L. & P. Co., Portland, Ore.
F. J. Nagle, W. W. P. Co., Uniontown, Wash.
B. L. Neill, So. Pacific Ry., Spokane, Wash.
Thos. W. Neill, Kootenai Pr. Co., Coeur d'Alene, Idaho.
H. R. Noack Pacific States Elec. Co. San Francisco, Cal.
J. F. NePage NePage McKenny Co., Seattle, Wash.
Bernhard Olsen, Gen. El. Co., Spokane, Wash.
G. L. Oman, G. E. Co., Portland, Ore.
M. C. Osborn, W. W. P. Co., Spokane, Wash.
C. P. Osborne, P. R. L. & P. Co., Portland, Ore.
F. T. Parker, Pac. P. & L. Co., Bend, Ore.
O. B. Penrose, Fobes Supply Co., Portland, Ore.
W. E. Peters, West Elec. Co., Spokane, Wash.
H. G. Peterson, H. W. Johns-Manville Co., Spokane, Wash.
H. E. Plank, G. E. Company, Seattle, Wash.
W. B. Putnam, Utah L. & P. Co., Salt Lake, Utah.
G. E. Quinan, P. S. T. L. & P. Co., Seattle, Wash.
D. E. Rae, P. P. & L. Co., Kennewick, Wash.
E. L. Reyer, Wood & Rever Inc., Seattle, Wash.
E. H. Richardson, Hotpoint Elec. Co., Ontario, Cal.
Miss Ardis Richardson, Ontario, Cal.
Mrs. E. H. Richardson, Ontario, Cal.
H. T. Van Riper, Hot Point El. Co., Seattle, Wash.
Chas. Robinson, W. W. P. Co., Spokane, Wash.
Gretta Robinson, W. W. P. Co., Spokane, Wash.
J. F. Roche, Mont. Pr. Co., Butte, Mont.
Geo. N. Rooker and wife, No. Idaho & Mont. Pr. Co., Sandpoint Idaho.
J. E. Royer, W. W. P. Co., Spokane, Wash.
Foster Russell, W. W. P. Co., Spokane, Wash.
Frank E. Ryan, S. H. L. & P., Co., Spokane, Wash.
L. A. Safford, P. P. & L. Co., Sunnyside, Wash.
Geo. C. Sawyer, P. P. & L. Co., North Yakima, Wash.
R. E. Scholer, W. W. P. Co., Odessa, Wash.
H. H. Schoolfield, P. P. & L. Co., Portland, Ore.
J. H. Siegfried, P. P. & L. Co., Portland Ore.
Mrs. J. H. Siegfried, Portland, Ore.
W. L. Scott, W. W. P. Co., Spokane, Wash.
J. D. Scott, P. R. L. & N. P. Co., Portland, Ore.
M. Sebern, Wash. Elec. Supply Co., Spokane, Wash.
R. C. Shipman, Nat. Elec. Utility Inc., Seattle, Wash.
V. G. Shinkle W. W. P. Co., Spokane, Wash.
I. A. Shorno, G. E. Co., Spokane, Wash.
Lewis M. Shreve W. V. G. & E. Co., Wenatchee, Wash.
Robert Sibley, Journal of Electricity, San Francisco, Cal.
Mrs. Robert Sibley, San Francisco, Cal.
L. M. Simpson, G. E. & P. Co., Grangeville, Idaho.
W. W. Spangler, Westinghouse Elec. & Mfg. Co., Seattle, Wash.
J. H. Sroufe Portland, Ore.
M. F. Steel, Benjamin Elec. Mfg. Co., San Francisco, Cal.
C. P. Stevens, Westinghouse Lamp Co., Seattle, Wash.
W. W. Taliferro St. John, Wash.
Mrs. Talioferro, St. John, Wash.
H. J. Tinkham, Pac. Tel. & Tel. Co., Spokane, Wash.
R. E. Thatcher, P. S. T. L. & P. Co., Seattle, Wash.
W. R. Thomas, W. V. G. & E. Co., Wenatchee, Wash.
J. R. Thompson, W. W. P. Co., Ritzville, Wash.
R. E. Tompkins, W. W. P. Co., Spokane, Wash.
C. H. Tompkins W. W. P. Co., St. Marries, Idaho.
R. M. Townsend, P. R. L. & P. Co., Portland, Ore.
Mrs. R. M. Townsend, Portland, Ore.
R. W. Turnbull, G. E. Co., Portland, Ore.
C. C. Turlay, P. P. L. & I. Co., Vancouver, Wash.
Mrs. C. C. Turlay, Vancouver, Wash.
H. W. Turney Wash. Elec. Supply Co., Butte, Mont.
C. F. Uhden, W. W. P. Co., Spokane, Wash.
J. A. Vandegrift, Nat. Lamp Works, Oakland, Cal.
W. C. Wagner, Bureau of Standards, Washington, D. C.
Edmund D. Walker B. C. Elec. Ry. Co., Vancouver, B. C.
Ed. Walsh, W. W. P. Co., Spokane, Wash
R. W. Watson, W. W. P. Co., Spokane, Wash.
Chas. J. Weller, Grant Co. Pr. Co., Coulee City, Wash.
H. E. West Portland G. E. Co., Portland, Ore.
C. L. Wernicke, Westinghouse Elec. Co., Portland, Ore.
Y. M. White, W. W. P. Co., Spokane, Wash.
H. R. Williams, S. C. P. & L. Co., Colville, Wash.
Roger Williams, W. W. P. Co., Wilbur, Wash.
W. C. Wiscombe, W. W. P. Co., Spokane, Wash.
J. W. Wood, W. W. P. Co., Spokane, Wash.
J. E. Woodbridge, S. & San F. Pr. Co., San Francisco, Cay
C. M. Wright, Wash. Elec. Supply, Spokane, Wash.
W. C. Wurfel, Westinghouse Lamp Co., San Francisco, Cal.
Garnett Young, Tel. Elec. Equip. Co., San Francisco, Cal.
C. R. Young, Pac. Lt. & Pr. Co., Portland, Ore.
F. J. Zorn, Pac. States El. Co., Seattle, Wash.

The Washington Association of Electrical Contractors and Dealers

The Washington Association of Electrical Contractors & Dealers held a closing session in the Moor ish room at the Davenport Hotel and elected the following officers: V. S. McKenny, Seattle, president; J. J. Agutter, W. M. Meacham and S. Hepler, vice-presidents for the Spokane division; H. C. Rothbach, vice-president for the Tacoma division; J. R. Martin, vice-president for the Bellingham division; Ralph Wiseman, vice-president for the Yakima division. William E. Chase of Spokane was selected to represent the association on the Pacific coast conference board.

The second annual convention of the Washington Association of Electrical Contractors and Dealers was held in Spokane at the same time as the convention of the Northwest Electric Light & Power Association. So interwoven have all affairs of the electrical industry become, it has proven greatly to the advantage of both organizations to hold sessions in joint gatherings. This convention of the electrical contractors and dealers surpassed in enthusiasm and helpfulness the fondest hopes of its leaders. Here is a list of the delegates and guests in attendance at the convention of Electrical Contractors & Dealers:

J. J. Agutter, J. J. Agutter Co., Seattle, Wash.
J. Don Alexander, Alexander Elec. Co., Spokane, Wash.
R. D. Allison Secretary and Treasurer of Association.
Chas. Barrett, Barrett Elec. Co., Hillyard, Wash.
J. A. Barry, C. H. E. Williams Co., Seattle, Wash.
Geo. F. Bryant.
Harry Byrne, North Coast Elec. Co., Seattle, Wash.
M. V. Burr, Burr Elec. Co., Spokane, Wash.
E. F. Coldren, Elec. Supply Co., Lewiston, Idaho.
W. E. Chase, Wm. E. Chase Eng. Co., Spokane, Wash.
A. F. Cook, Inland Elec o., Spokane, Wash.
Geo. R. Cooley, Geo. R. Cooley Elec. Co., Seattle, Wash.
W. A. Davis, City Elec. Inspector, Spokane, Wash.
P. Defayter Power City Elec. Co., Spokane, Wash.
Chas. A. Duncan, Duncan Elec. Co., Spokane, Wash.
R. T. Evans, R. T. Evans & Co., Seattle, Wash.
A. E. Griswold A. G. Elec. & Mfg. Co., Seattle, Wash.
H. R. Harris, Fobes Supply Co., Seattle, Wash.
S G. Hepler, Arrow Elec. Co., Seattle, Wash.
A. E. Griswold, A. G. Mfg. Co., Seattle, Wash.

W. E. Jones Economy Fuse Co., Chicago, Ill.
Hugh L. Kimball, Kimball Elec. Co., Oakland, Cal.
(Representing the California Association of Contractors and Dealers)
A. P. Kline, San Francisco, Cal.
G. P. Labberton, North Yakima, Wash.
Geo. Larson, Mills & Larson, Bellingham, Wash.
R. K. LeGrand, Elec. Fixt. & Const. Co., Seattle, Wash.
V. S. McKenny NePage & McKenny, Seattle, Wash.
Mahlon McCain, Austin-McCain Co., Spokane, Wash.
J. G. Maitland, Elec. Engineering Co., Seattle, Wash.
J. L. Martin, Modern Elec. Co., Bellingham, Wash.
W. M. Meacham, Meacham & Babcock, Seattle, Wash.
D. J. Metcalf, Metcalf Elec. Co., Seattle, Wash.
J. R. Mitchell Doerr-Mitchell Elec. Co., Spokane, Wash.
T. P. Mosso, Spokane, Wash.
E. G. Mundy, Mundy, Rolland & Co., Vancouver, B. C.
(Representing the British Columbia Association of Contractors and Dealers)
C. O. Nelson Elec. Construction Co., Tacoma, Wash.
J. F. NePage, NePage & McKenny, Seattle, Wash.
Warren Oliver, Warren Oliver Elec. Co., Spokane, Wash.
W. E. Peters, Western Elec. Co., Spokane, Wash.
H. C. Rohrback, Elec. Service Co., Tacoma, Wash.
R. W. Rust, Rainier Elec. Engineering Co., Spokane, Wash.
A. T. Shortley, Elec. Engineering Co., Spokane, Wash.
Ferrester E. Smith, Secretary Contractors and Dealers Association. Seattle, Wash.
J. H. Sroufe, NePage & McKenny Co., Portland, Ore.
(Representing Oregon Association Contractors and Dealers)
V. P. Sutherland, Miller's Mutual Fire Ins. Co., Seattle Wash.
Lewis C. Sutherland, Elec. Sup. & Fix. Co., Walla Walla, Wash.
Hugh L. Tinling, Hutton, Tinling Elec. Co., Spokane, Wash.
R. B. Wiseman Elec. Supply & Fixture Co., Ellensburg, Wash.

Member Companies Represented

Agutter, J. J. & Co., Seattle, Wash.
Alley Electric Co., Seattle, Wash.
Alexander Elec. Co., Spokane, Wash.
Austin-McCain Co., Spokane, Wash.
Arrow Electric Co., Seattle, Wash.
Barrett, Chas., Hillyard, Wash.
Burr Electric Co., Spokane, Wash.
Chase Engineering Co., Spokane, Wash.
Cooley, Geo. R. Electric Co., Seattle, Wash.
Curran Electric Sign Co., Spokane, Wash.
Doerr-Mitchell Electric Co., Spokane, Wash.
Electric Construction Co., Tacoma, Wash.
Electric Service Co., Tacoma, Wash.
Electric Fixt. & Con. Co., Seattle, Wash.
Electric Engineering Co., Seattle, Wash.
Electric Supply & Fixture Co., Walla Walla, Wash.
Evans, R. T. & Co., Seattle, Wash.
Hutton, Tinling Electric Co., Co., Spokane, Wash.
Inland Electric Co., Spokane, Wash.
Labberton, G. P., North Yakima, Wash.
Meacham & Babcock, Seattle, Wash.
Metcalf, D. J. & Co., Seattle, Wash.
Mills & Larson, Bellingham, Wash.
Modern Electric Co., Bellingham, Wash.
Mosso, T. P., Spokane, Wash.
NePage, McKenny, Seattle, Wash.
Power City Electric Co., Spokane, Wash.
Puget Sound Traction, Light & Power Co., Seattle, Wash.
Rainier Electric Co., Seattle, Wash.
Spokane Heat, Light & Power Co., Spokane, Wash.
Warren Oliver Electric Co., Spokane, Wash.
Washington Water Power Co., Spokane, Wash.
Williams, C. H. E., Seattle, Wash.

THE OREGON ASSOCIATION OF ELECTRICAL CONTRACTORS AND DEALERS

Delegates and Guests at the Eugene Convention of the Oregon Association of Electrical Contractors and Dealers

Co-operation and a spirit of mutual helpfulness seemed to be the keynotes struck at the second annual convention of the Oregon Association of Electrical Contractors & Dealers which was held at Eugene, Oregon, on September 17 and 18, with some fifty-five persons in attendance.

The three principal speakers at the banquet were Dr. S. D. Read of Eugene, Albert H. Elliott of San Francisco and Wm. C. Bristol of Portland.

The open meeting was held on the afternoon of September 17 at 2 o'clock and the following program was carried out:

Convention called to order at convention headquarters.

Address of welcome, J. E. Shelton, Esq., editor Eugene Guard and chairman of Publicity and Convention Bureau of Eugene Chamber of Commerce. Response, F. C. Green of Portland, Ore., president Oregon Association of Electrical Contractors & Dealers.

Paper, "Business Methods and Outlook," by C. D. Rorer, Esq., of Eugene, president Bank of Commerce Eugene, Ore.

Address, "Oregon's Electrical Industry," by Franklin T. Griffith, Esq., president Portland Railway, Light & Power Company.

Paper "The Need of Proper Electrical Inspection and How to Organize an Electrical Inspection Department," by F. Dunlap, Esq., of Portland, chief electrical inspector, Bureau of Buildings.

Paper, "The Electrical Jobber," by J. I. Colwell, Esq., Northwest manager Western Electric Company, Seattle Wash.

Paper, "The Electrical Contractor and Dealer," by J. H. Sroufe, of NePage, McKenny Co., Portland.

Albert H. Elliott delivered an address, his subject being "The Need of Organization to Satisfactorily meet the Growing Electrical Industry."

The business meeting was called to order by President F. C. Green at 9:30 a. m. September 18. A large volume of business was transacted and the election of officers for the coming year was held and resulted in the following being elected:

President: A. S. Halls, Miller & Halls, Portland.

Vice-president, first district—S. C. Jaggar, Morrison Electric Company, Portland; J. H. Sroufe, Ne-

Page-McKenny Company, Portland; E. W. Pierce, Beaver Electric Company, Portland.

Vice-president, second district—B. W. Paul, Paul's Electric Store, Medford, Ore.

Vice-president, third district—John L. Vaughan, Pendleton Ore.

Executive Committee—Robert W. Larsen, M. J. Walsh Company, Portland; E. L. Knight, E. L. Knight & Co., Portland.

Delegate to Western Conference Board—J. H. Sroufe; Alternate, B. W. Paul.

Miscellaneous Notes

J. R. Mitchell of Doerr-Mitchell Company, Spokane, represented the Washington Contractors' Association at Eugene.

* * *

J. Chuckland of Vancouver, B. C., represented the B. C. Contractors' Association at the Oregon convention.

* * *

A mixed party (assortment of manufacturers and jobbers) left Eugene at the close of the convention for the upper part of the Willamette River. Watch for a sharp decline in the price of meat and fish and a marked increase in fish stories.

* * *

The speakers at the banquet Monday evening held the interesct of the crowd until so late that the bowling match between the jobbers and contractors had to be abandoned.

* * *

J. H. Sroufe saw to it that every one became acquainted on the car going down.

* * *

Names Are Given of Men at Eugene Convention

W. G. Cumming of Cole & Cummings, Corvallis, Ore.
J. R. Ralston, of Ralston Electric Supply Co., Albany, Ore.
A. O. Nash, of Nash Electric Co., LaGrande, Ore.
B. W. Paul, of Paul's Electric Store,, Medford, Ore.
Hugh Kimball, of Cal. Assn. of E. C. & D., Oakland, Cal.
J. Churchland, of British Columbia Association of E. C. & D., Vancouver, B. C.
J. R. Mitchell, of Doerr, Mitchell Elec. Co., Spokane, Wash.
J. I. Colwell, C. W. Chestnut and J. J. O'Reilly, of Western Electric Co., Seattle, Wash.
W. M. Deming, of Journal of Electricity, San Francisco, Cal.
E. M. Haig of Manhattan Electrical Supply Co., San Francisco.
S. B. Gregory, of Arrow Electric Co., San Francisco, Cal.
Albert H. Elliott, of Jobbers' Association.
C. M. Will, of Fobes Supply Co., of Portland, Ore.
J. J. McCarthy, of Fobes Supply Co., Portland, Ore.
R. G. Cogley of Tel. Elec. Equip. Co., of Portland, Ore.
H. W. Floyd, Marshall-Wells Hardware Co., Portland, Ore.
John Ryan, of Western Electric Co., Portland, Ore.
M. H. Nichols, of Western Electric Co., Portland, Ore.
George Boring, R. P. Snoke, Wm. Werner and Fred C. Todt, of Pacific States Electric Co., of Portland, Ore.
Lyle G. Fear, of Westinghouse Elec. Co., Portland, Ore.
Carl F. Caufield of Local 18, I. B. E. W.
W. J. Dennit, G. E. Frey and L. H. Kennedy, of N. W. Elec. Co.
F. D. Weber, of Oregon Ins. Rating Bureau, Portland, Ore.
W. E. Conklin, of J. C. English Co. Portland, Ore.
W. S. Bridges, of M. J. Walsh Co., Portland, Ore.
S. W. Peterson, of Stubbs Electric Co., Portland, Ore.
C. P. Scott, of Scott Electric Co., Portland, Ore.
F. M Vanderlip, of Vanderlip & Lord, Portland, Ore.
F. E. Meyers and H. L. Niles of H. M. H. El. Co. Portland, Ore
I. B. Sturges, of Sturges & Olsaver, Portland, Ore.
C. C. Buchanan, of Portland Elec. Maintenance Co., Portland.
J. H. Sroufe, of NePage, McKenny Co., Portland, Ore.
J. E. NePage, of NePage, McKenny Co., Seattle, Wash.
F. C. Green, of E. L. Knight & Co., Portland, Ore.
Wm. H. Smith, of Smith-McCoy Electric Co., Portland, Ore.
R. R. Poppleton, Portland, Ore.
F. A. Bauman, of F. A. Bauman & Co., Portland, Ore.
J. R. Tomlinson, of Pierce-Tomlinson Elec. Co., Portland, Ore.
O. B. Coldwell of Portland Ry. Light & Power Co., Portland.
A. S. Halls, of Miller & Halls, Portland, Ore.
S. C. Jaggar, of Morrison Electric Co., Portland. Ore.
E. W. Pierce, of Beaver Electric Co., Portland, Ore.
S. Sanderson of Bryant Electric Co., San Francisco.
W. C. Bristol, of Portland, Ore.
P. B. Womeldurf, of Comet Electric Co., Eugene Ore.
J. W. Obender, Portland, Ore.
L. B. Sigwart, of Sigwart Elec. Co., Eugene, Ore

UTAH SOCIETY OF ELECTRICAL CONTRACTORS

An invitation is extended to all interested to attend the first annual convention of the Utah Society of Electrical Contractors, which will be held at Salt Lake City, Friday and Saturday, October 5 and 6, 1917. Arrangements are in progress to make this one of the greatest gatherings of electrical men ever held in this city. It is planned to make this convention of great value to all electrical men throughout the state and we need you there to make it the success that is desired. The convention committees consists of J. V. Buckle, president; E. H. Eardley, secretary; G. J. Guiver, manager.

W. R. Putnam, salesmanager of the Utah Power & Light Company, is taking a keen interest in helping to make the convention a success.

The Utah Society of Electrical Contractors is organized for the purpose of bettering conditions in the contracting business. The society believes in the principle of "One for all and all for one," and advocates; a higher standard of business ethics; more business-like methods and standardization of business practices; more accurate methods of figuring costs, to the end that there may be fewer failures in the contracting business; highest standard of electric contsruitcon; "safety first" as a first consideration; peaceful adjustment of labor disputes, and greater co-operation among individuals in the contracting business.

PROGRAM FIRST SEMI-ANNUAL CONVENTION OF UTAH SOCIETY OF ELECTRICAL CONTRACTORS,

Salt Lake City, Utah, Oct. 5-6, 1917

Friday, 12 Noon

Luncheon in the ladies' dining room of the Salt Lake Commercial Club.

Address of welcome, President J. V. Buckle.

Address, Governor Simon Bamberger, Governor State of Utah.

Paper, Relationship of the Contractor to the Central Station—W. R. Putnam, Division Manager of Salt Lake City, W. P. & L. Company.

Paper, The Jobber and Its Relation to the Contractor—C. B. Hawley, General Manager of Inter-Mountain Electric Company. Why the Need of a State Organization, by E. H. Eardley, Eardley Bros. Company.

Two-minute discussions.

Adjournment.

State Fair.

8:00 p. m. Bowling at Quinn's Orpheum Hall, Contractors of Salt Lake vs. Electrical Jobbers; E. R. Dobb of the Capital Electric Company, captain of the Contractors' team; R. S. Folland of the Capital Electric Company, captain of Jobbers' team.

Good Morning.

Saturday, October 6th

2:00 p. m. Assembly Room, Salt Lake Commercial Club.

Election of Officers.

Address, Rev. P. A. Simpkins.

Paper, The Need of a State Electrical Inspection and Organization of a State Electrical Inspection Bureau—F. C. Winegar, chief electrical inspector, Bureau of Inspection of Salt Lake City, Utah.

Paper, G. J. Guiver, The Electrical Contractor.

Paper, The Electrical Industry, Lafayette Hanchett,. County Commissioner of Salt Lake City.

Three-minute discussions.

Adjournment.

Take autos at Commercial Club for the site-seeing trip to the mammoth cantonment camp at Fort Douglas and seeing Salt Lake City.

6:00 p. m. Dinner at Commercial Club, compliments of Utah Power & Light Company.

8:00 p. m. Newhouse Hotel, dancing, music, refreshments. Good-bye

Committees

Constitution and By-Laws—W. R. Putnam, Utah Power & Light Co., Mr. Ackerman, Capital Electric Co.; C. R. Hawley, Inter-Mountain Elec. Co.; E. H. Eardley, Eardley Bros. Co.; G. W. Forsburg, Inter-Mountain Elec. Co.

Finance—E. H. Eardley, C. B. Hawley, W. R. Putnam, H. D. Randall, — Talmage, — Ackerman.

Entertainment—J. V. Buckle, G. J. Guiver, E. Brazier, Inter-Mountain Elect. Co.; Mr. Nicholl, Western Electric Co., F. C. Wolters.

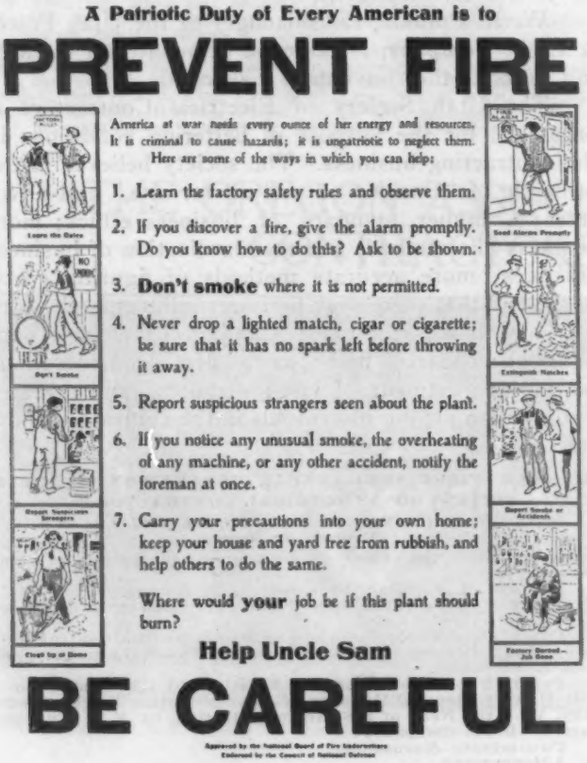
Sight-Seeing—James Swyers, L. C. Robbins, A. G. Hill, Jr.

Bowling—R. S. Folland, Captain, Jobbers' team; E. R. Dobb, Captain, Contractors' team.

GERMANY'S AMERICAN ALLY

(A bulletin just issued by the National Board of Fire Underwriters contains startling information on the gigantic losses by fire in America. Men of the electrical industry can do much in the future to prevent much of this needless waste. Excerpts from this bulletin are given below summarizing this loss.—The Editor.)

Germany has a powerful ally working within the boundaries of the United States. Its operations are very effective. It enters munition plants and causes explosions. It cripples hundreds of factories which are laboring to produce war time necessities. It waits until the grain in the fields is ripe for harvest and then destroys it over thousands of acres, or else it bides its time until the harvested crops have been


A Patriotic Duty of Every American is to
PREVENT FIRE
America at war needs every ounce of her energy and resources. It is criminal to cause hazards; it is unpatriotic to neglect them. Here are some of the ways in which you can help:
1. Learn the factory safety rules and observe them.
2. If you discover a fire, give the alarm promptly. Do you know how to do this? Ask to be shown.
3. Don't smoke where it is not permitted.
4. Never drop a lighted match, cigar or cigarette; be sure that it has no spark left before throwing it away.
5. Report suspicious strangers seen about the plant.
6. If you notice any unusual smoke, the overheating of any machine, or any other accident, notify the foreman at once.
7. Carry your precautions into your own home; keep your house and yard free from rubbish, and help others to do the same.
Where would your job be if this plant should burn?
Help Uncle Sam
BE CAREFUL

A Poster to Aid in Fire Prevention

stored in elevators, and obliterates them by the hundreds of thousands of bushels. It operates in every city and town, and in the country districts. It is unceasing in its activities, working by night as well as by day, and for every hour of the twenty-four. It enters countless homes, bringing devastation and sorrow; and last, but not least, it causes heavy loss of life.

This foe is not an "alien enemy," but comes of good American stock. It is encouraged by millions of people who believe themselves to be patriotic. Without their help, it would soon be overcome; for the name of this great enemy is Preventable Fire, and its principal cause is American carelessness.

Putting their average cost at $7500 apiece, America in a year burns up the value of 30,000 airplanes, and 30,000 airplanes would win the war; or, to put it in another way, the nation's fire bill, if it could be applied to their construction, would supply our navy with one hundred and fifty destroyers, and such an added force would end the menace of the submarines.

The two billion dollar Liberty Loan carries an annual interest charge of $70,000,000, but the United States burns up each year enough property to pay interest upon more than three Liberty Loans.

In destitution in the bereaved homes of France are multitudes of the children of those who have given their lives upon the battle field. Appeals have been made to American benevolence upon the basis of ten cents per day per child to provide for their immediate necessities. Six million such little ones, or far more than the total number in need, could be supported for the cost of our senseless destruction.

An investment of $60,000 will equip a base hospital, capable of caring for 500 sick or wounded; if American people would change their habits to those of carefulness, 3600 such hospitals might be supplied by means of the money thus saved from fire destruction. This would approximate one to each half-mile on all European battle fronts.

From whatever standpoint it is examined, therefore, it must be realized that every preventable fire, little or big, is to some degree "an aid and comfort to the enemy." This is a matter of individual responsibility. Each one must take it to himself as a personal matter. There are fifteen hundred fires each day, or more than one per minute. What right has anyone to assume that all of these will occur upon the premises of "other people?" Unless he resolve this day that there shall be no such occurrence in property controlled by him, and unless he make this resolve effective by means of an immediate inspection and correction of all fire hazards, he cannot be considered a true patriot no matter what may be his professions.

AMERICAN COMMERCIAL EXPERTS IN FAR EAST

Paul Page Whithan is investigating ports, shipping, railways and other transportation facilities in the Far East and Russia. Mr. Whithan, a consulting engineer, has been identified with important port, railway and industrial engineering development during the past 12 years. He arrived in Shanghai the first of May and is making this city his headquarters for the China work, which it is expected will take over a year, much of the time being spent in travel.

J. Morgan Clemments is investigating mines and mining in the Far East. Mr. Clemments, mining engineer of New York, has had an extended experience in the United States. He arrived in Japan about six weeks ago, where he is now at work. Later he will cover Korea and China.

C. E. Bosworth is investigating markets for boots and shoes in the Far East. Mr. Bosworth is a man of wide practical experience in the shoe industry and trade. He should arrive in Shanghai shortly, having first visited Australia.

SPARKS—Current Facts, Figures and Fancy

(The gist of new applications of engineering in general and electricity in particular, are here gathered for the convenience of the busy reader. Light from the four quarters of the globe is thus availably concentrated for possible use in solving your special problems.—The Editor.)

During the year ending June 30, 1917, 1876 ships passed through the Panama Canal as compared with 787 in 1916 and 1088 in 1915. The cargo carried aggregated 7,299,225 tons.

* * *

Electric fans for drying fruits and vegetables are recommended by the U. S. Department of Agriculture. The color is better and spoilage less in using this method as the product is kept cool by evaporation while drying.

* * *

The U. S. Bureau of Standards is working on a circular giving information on street lighting. Measurements have been made on two types of arc lamps to determine the distribution of light and the variation of candlepower and efficiency with current.

* * *

English women perform from 60 to 80 per cent of the machine work on shells, fuses and trench warfare supplies. They have been trained in aeroplane manufacture, in gun work and almost every other branch of manufacture, more than sixty technical schools and colleges being used for training purposes by the Ministry of Munitions.

* * *

The high cost of kerosene is stimulating the use of electricity for lighting in China. The rates at Foochow are 28 cents (Mex.) per kw.-hr., with an additional monthly charge of $1.50 (Mex.) for meter charge. Two-thirds of the 36,000 lamps in use in this Chinese city are on a flat rate of $1.00 (Mex.) per lamp per month. A 1000 kw. steam turbine has just been installed.

* * *

The Underwriters Laboratories are greatly interested and wish to secure information regarding some lines of electrical fittings manufactured in Japan, including sockets, snap switches and rosettes that within the past few months have been placed on the market in certain parts of the United States and Canada. The laboratories would like to know regarding the experience of those handling the goods mentioned.

* * *

Electric stimulation of plant growth offers attractive possibilities to increasing the crop production of Western farmers. The electro-culture apparatus developed by Sir Oliver Lodge in England is similar in many respects to that used in the Cottrell process for the electrical precipitation of smelter fumes. A method of small galvanized steel wire spaced at 30 ft. intervals is suspended at an average height of 15 ft. over the area to be electrified. Direct current is intermittently supplied at 120,000 volts. Practical experiments have demonstrated a 49 per cent increase in grain production and 25 per cent in vegetables.

"One important thing that war has accomplished is to prove that electricity will do man's work better, more quickly and at less expense than any other way." Likewise with woman's work.

* * *

The California Land Settlement Board is making rapid progress in its plans. The Board is ready to purchase from 4000 to 6000 acres of farm land and will improve, sub-divide and settle it. The land will then be sold for a small initial payment with 20 to 36 years to pay the balance, the purpose being to establish colonies of independent farmers. The system has been successful in twenty other countries, but is being tried here in America for the first time. Prof. Elwood Mead, University of California, Berkeley, is chairman of the board.

* * *

Colonel Harvey, in the North American Review, under the caption, "When Peace Comes, What?" gives a new angle to the government and municipal ownership idea. "There can scarcely be a greater delusion than that government ownership and operation of industries and utilities is the only alternative to monopolies and offensive trusts. It is as unreasonable and as unfounded as to say that anarchy is the only alternative to despotism. The essential spirit of democracy requires for the individual a free initiative in industry just as much as in politics. The citizen must be as free to work or to trade as he is to vote. Moreover, there must be similar freedom of combination; and as citizens are free to combine themselves into political parties, in order to exert an influence and to accomplish ends which would be beyond their reach if acting individually, so they must be free to combine in business corporations, in order to effect results which would be impossible to individuals. That is democracy."

* * *

The Nitrate Supply Committee, appointed by the Secretary of War, has decided to build a plant employing the synthetic ammonia process of the General Chemical Company. The exact location is withheld, but will probably be in the vicinity of southwest Virginia. The ammonia will be oxidized to nitric acid, the daily capacity of the plant to be equivalent to 24,000 lb. of 100 per cent nitric acid in a 24 hour day. Experiments are also authorized on the Bucher process for the production of sodium cyanide and ammonia. The building of by-product coke ovens is also to be encouraged, but "the decision as to more extensive installation of nitrogen fixation processes and water power development in connection with them is postponed until the plants above recommended are in operation or until further need arises."

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THE SLACKER

"I'm not supposed to do that," said he,
When an extra task he chanced to see;
"That's not my job, and it's not my care,
So I'll pass it by and leave it there."
And the boss who gave him his weekly pay
Lost more than his wages on him that day.
"I'm not supposed to do that," he said;
"That duty belongs to Jim or Fred."
So a little task that was in his way,
That he could have handled without delay,
Was left unfinished; the way was paved
For a heavy loss that he could have saved.
And time went on and he kept his place,
But he never altered his easy pace,
And folks remarked on how well he knew
The lines of task he was hired to do;
For never once was he known to turn
His hand to things not of his concern.
But there, in his foolish rut, he stayed
And for all he did he was fairly paid,
But he never was worth a dollar more
Than he got for his toil when the week was o'er;
For he knew too well when his work was through,
And he'd done all he was hired to do.
If you want to grow in this world, young man,
You must do every day all the work you can,
If you find a task, though it's not your bit,
And it should be done, take care of it;
And you'll never conquer or rise if you
Do only the things you're supposed to do.
—Edgar A. Guest, Detroit Free Press.

Appreciative Thanks

The Journal of Electricity entered into the promotion of the September electrical conventions throughout the West because its policy is sworn to the upbuilding of everything that is good and wholesome in affairs electrical in this promising section of our country and in the countries bordering the great Pacific.

To this end the September fifteenth issue was devoted almost exclusively to the papers and discussions of the Northwest Electric Light & Power Association. In addition to this, a Service Issue containing twenty pages of convention happenings and personal items was published during the convention week at Spokane. To have had the inner realization that the Journal of Electricity had been a small factor in contributing to the marked success of the beautiful Spokane convention would have been in itself sufficient reward for the effort and expense involved.

It is hence with profound and deepest appreciation that acknowledgment is here made of the wonderful reception that was given to this effort by the convention delegates and guests. The calling off of the convention proceedings by the chairman in order to urge upon the hosts assembled the cordial support of the Journal of Electricity and its undertakings, the formal resolution from the Executive Committee, the expression of thanks by resolution from the floor of the convention, and finally the beautiful words of introduction of a representative of the Journal of Electricity at the joint banquet by the toastmaster in the closing hours of the convention, will long be cherished and will serve to spur its editorial and managerial staff to keener endeavor.

New Records in Water Wheel Design

The early putting in of the small hydroelectric unit of the Pacific Gas & Electric Company near the great Spaulding Dam, is interesting to engineers generally in that a variable head is made use of. This installation also contrasts strongly with the Wise plant of the company, which was thrown into service last spring, in that the Wise plant has a penstock piping over a mile and a half in length, while this new plant may be said to possess practically no length of penstock piping at all, since the water is taken directly from the pressure tunnel feeding from the dam above.

The varying heights of storage possessed by the Spaulding Lake reservoir will have as a consequence an unusual control over the available head for power generation. This fact has been allowed for in the design of the units involved and their successful operation will be watched with considerable interest by engineers generally.

At the White River plant of the Puget Sound Traction, Light & Power Company some miles south of Seattle, a new world's record in water wheel capacity is about to be established. Some years ago there was installed at this plant a water wheel unit of 18,000 h.p. capacity which at that time was known to be the largest in existence.

Later the Washington Water Power Company's installation at Long Lake, some thirty miles west of Spokane, eclipsed this record by the installation of a unit of 22,500 h.p. capacity. The new unit at White River, designed for 23,000 h.p., will again bring back the record to the vicinity of Seattle.

But the main source of gratification to engineers of the West, in following these installations comes from the fact that not only are records in size constantly surpassed in the West but increased efficiency in each succeeding unit is also to be noted.

Iron as a Conductor of Electricity

Since the publication of a series of articles in the columns of the Journal of Electricity something over a year ago on the subject of iron as a conductor of electricity, by Clem A. Copeland, a host of inquiries have come to the editorial department of the Journal of Electricity from practically every section of the country on matters connected with this new departure in electrical transmission.

Due to the increasing cost of copper wire, iron as a conductor for even long distance transmission installation is bound to play an ever increasingly important part.

Not only has it found application in the wiring of homes and countless other uses in distribution throughout numerous sections of the West, but it will be interesting news to our readers to know that iron is now employed in long distance transmission of hydroelectric energy.

The new installation of the Montana Power Company from Thompson Falls, Montana, to the Coeur d'Alene mining district, some twenty-five miles in length, is accomplished entirely by lines of iron.

Recent tests on iron wire transmission are interesting. While very little difference in efficiency of transmission was noticeable, the poor regulation of iron was very obvious when the wire was used at high-current density. From a mechanical standpoint, however, the great strength of iron wire compared with copper enables the use of longer spans, hence the number of poles and towers required is greatly reduced.

Investigations of reactance phenomena and other characteristics of iron as compared with copper are now under way in this installation. Already the operation of the line has proven a success and the revision of formerly preconceived mathematical deductions seems inevitable.

The Power of Visual Instruction

Education is today recognized as the most powerful weapon in salesmanship. When the consumer is educated to the idea—in other words, when the idea itself is sold, the actual vending of the material ware becomes a simple matter.

There is daily growing upon the minds of thoughtful men the fact that in the past the flow of intelligence has too largely been transmitted through words while seldom has the power of visual instruction been made use of in modern salesmanship.

A recent achievement in visual instruction in the extension division of a university of the West is interesting. First it was proven that instruction from the printed page concerning matters pertaining to the electrical industry was not to be compared with matter that showed the processes of manufacture and use by means of pictures. Next it was found that instruction by pictures was not to be compared with instruction that exhibited the article itself. And finally, instruction in which the article is exhibited is not to be compared with an exhibit showing the step by step processes in manufacture and use.

Various manufacturers of electric ranges, telephones, vacuum cleaners and countless other pieces of electrical apparatus have been induced to donate these step by step exhibits and they are now being sent to all of the public schools that are interested and as a consequence remarkable results are being attained. Pictures of certain of these interesting exhibits are to be found on another page of this issue.

This recent unique advance in educational method has a wholesome lesson for the electrical industry throughout the West. Increased attention to the psychology of the show window means a study of visual instruction for the electrical contractor and dealer. The making of simple models showing the operation of the electric meter by the central station would help greatly to clarify the befogged mind of the housewife. Indeed, looking about us, it is easy to see countless new applications for the transmission of intelligence through visual instruction.

Increased study of this method of instruction is well worth the effort in our campaigns to sell the electrical idea.

Overdoing Accident Prevention

The Journal of Electricity has long advocated through its editorial columns, the thorough dissemination of all propaganda leading to the "Safety First" ideal in the construction and maintenance of the great engineering accomplishments of the West. To this end editorial comment has been set forth time and again favoring the establishment of industrial accident commissions and calling upon the Bureau of Standards at Washington to take the lead in formulating reasonable and far-reaching standards of construction that would insure safety to the workman and protection to life and property of the public generally.

It would seem in these later days, however, that in some instances the well-desired ideal of "safety first" is being perverted into the slogan of "safety mad."

It must be recognized that there is a human limit to which expense and design can be carried to prevent the infinite and remote possibilities of accident. Such recognition is necessary in the drafting of the proposed rules of safety now under discussion by the Bureau of Standards or they must fail of their real purpose.

Sane, reasonable demands in construction and operation in which the higher motives and ideals of all concerned—the engineer, the employer, the laborer, the general public—are drawn into play, can alone bring about the desired result—namely the prevention of accident.

That accidents can not wholly be prevented, even in the best regulated family, has been forcefully brought home to men in the West during the past two-week period. Hiram Conibear, the well-beloved and widely known athletic coach at the University of Washington, was known for his prowess in athletic strength and caution in habits of life. Yet the climbing out on a fruit tree only a few feet above ground, to gather fruit for breakfast, caused his fall and consequent instant death by fracture of his neck. The instance has from its very homely occurrence and apparently impossibility of prevention shocked the entire younger generation of the West.

Accident commissions may argue that even strong, husky athletes should not climb fruit trees or that ten thousand dollars should be spent on each orchard in installation of props to prevent falling from fruit tree limbs, but the fact remains that accidents of this nature can scarcely be avoided.

And so in all branches of industry ideas of safety must be promulgated in such a manner as to be sane and within the possibility of reasonable occurrence. It is to be hoped that the undercurrent of protest now inwardly felt among men of industry and engineering endeavor may be at an early date lessened by somewhat more reasonable and sane demands from accident commissions and other bodies of similar nature.

Rates for Electro-Metals Installations

The hearings of the electro-metals case before the California Railroad Commission have already received editorial comment in the columns of the Journal of Electricity.

It will be illuminating as well as interesting to hear of an electro-metals institution in the middle west that has now been operating at a comfortable profit for over a year and the power rate under which service is rendered by a large hydroelectric institution generating power from the waters of the Mississippi River.

The load called for by this installation is now about 7500 kw., the power factor is 94 per cent or better and the load factor is just under 90 per cent.

The rate granted is on the basis of a 75c per month standby charge for each kw. of demand. In addition a ½c per kw.-hr. excess charge is made for energy consumed. In consideration of this low rate the electro metals company agrees to discontinue its demand at any time it is notified by the power company by a 48 hour warning. Or should the electro-metals company desire to avoid the possibility of this interruption it is to pay 6/10c per kw. excess charge. The demand is determined by taking into account the highest peak load of the month and integrating over a 30 minute period.

The electro-metals company is situated within 2½ miles of the power plant.

The hearing of the electro metals case in California has received marked attention from all quarters. On the one hand, the possible encouragement of new power load is to be achieved by the granting of a low rate, while on the other hand, the demand for power on all sides by other industries already occupying the field would perhaps justify a reasonably higher rate being put into effect.

In view of the fact that the rate just mentioned, which by the way is of record with the Illinois regulatory body, is a higher one than that offered by the power companies of California before the recent hearing in San Francisco and in view of the fact that the electro-metals company involved is itself operating at a profit, it would seem that this instance should prove of unusual interest in the discussion of the economic question involved.

THE NEW JOURNAL SERVICE: Journal service consists in anticipating the reader's wants. The better the publisher's judgment as to what will please the reader, the more successful will be the journal. Our growing list of subscribers is tangible evidence that the service rendered by the Journal of Electricity is appreciated. But in order to increase and improve this service more rapidly our list of subscribers should grow faster. To stimulate this growth we plan to start a subscription contest, full details of which will be announced in the next issue. As a reward for the securing of new subscribers fifteen prizes are to be given, including an automobile, a cabinet type phonograph and liberal cash prizes. Service is like a telephone instrument in that it should be equipped with a transmitter as well as a receiver. No one can consistently take without giving. So we ask our subscribers to solicit their friends to partake of the benefits of Journal service. Thus you can help them, help us and help yourself.

PERSONALS

S. Waldo Coleman, general manager of the Coast Counties Gas & Electric Company, was a recent host to the employes and officials in the five towns served by his company—San Francisco, Gilroy, Hollister, Watsonville, and Santa Cruz. The close ties engendered between employer and employe at these annual beach gatherings at Santa Cruz is responsible in a large measure for the excellent esprit de corps maintained throughout the organization of this utility company.

W. S. Berry, Pacific Coast sales manager Western Electric Company, is at New York City.

Harry F. Hartzell secretary of the Baker-Joslyn Company, is visiting the firm's Seattle office.

E. M. Cutting, Pacific Coast manager Edison Storage Battery Company, is making an extended Eastern trip.

Clifton Peters has been appointed assistant secretary of the Southern California Edison Company at Los Angeles.

S. M. Kennedy, general agent Southern California Edison Company, is spending his vacation at Lake Tahoe, California.

L. E. Sperry, representative New York Insulated Wire & Cable Company, at San Francisco, is visiting Portland, Seattle and Spokane.

A. E. Morphy, secretary Southern California Edison Company of Los Angeles, is in the officers' training camp at the San Francisco Presidio.

J. C. Manchester has severed his connection with the Interstate Novelty Company. **R. Wolf** has been appointed to succeed Mr. Manchester.

B. E. Hannon has resigned as manager of the Sacramento division of the Great Western Power Company to enlist in the Signal Reserve Corps.

C. Jones, electrical engineer of the transformer department of the General Electric Company at Schenectady is a recent San Francisco visitor.

Albert F. Menzel, assistant superintendent in charge of the Las Plumas plant of the Great Western Power Company, is a recent San Francisco visitor.

J. G. Monahan, Los Angeles, manager Edison Storage Battery Company and Sangamo Electric Company, was at San Francisco during the past week.

M. S. Orrick has been appointed assistant sales manager of the Western Electric Company in entire charge of the business of the San Francisco district.

R. J. Clavenger, of the Phoenix Glass Company of New York City, is making his annual trip to the Pacific Coast cities and recently passed through San Francisco on his way to Portland.

L. J. Moore, formerly chief load dispatcher San Joaquin Light & Power Corporation, Fresno, Cal., has succeeded **A. S. Kalenborn,** resigned, as electrical engineer for the company.

Claude C. Brown, formerly in the steam department of the Pacific Gas & Electric Company, is now power engineer for the Hawaiian Sugar Refinery Company at Crockett, California, in charge of steam and electric operation and construction.

William Kent, the author of Kent's Mechanical Engineers' Pocket Book, is a San Francisco visitor and was the guest of honor at a recent banquet at the San Francisco Engineer's Club.

J. D. A. Cross, in charge of heating appliance sales for the General Electric Co., took an important part in the electric range discussion at the Spokane convention of the Northwest Electric Light & Power Association.

D. D. Clarke, water engineer at Portland and builder of the fourteen million dollar water system for that city, has resigned. **F. M. Randlett** has been appointed water engineer and **Ben Morrow,** principal assistant water engineer.

B. C. Condit, formerly chief engineer with the Northwestern Electric Company at Portland, is supervising the electrical construction and equipment of the Crown-Willamette Paper Company's pulp and paper plant on the British Columbia Coast.

G. B. Muldaur, field secretary, National Electric Light Association, has returned to New York City after visiting Pacific Coast power centers and representing the association at the convention of the N. W. Electric Light & Power Association.

A. S. Kalenborn has resigned as electrical engineer for the San Joaquin Light & Power Corporation to accept a position as electrical engineer and superintendent of power for the Cerro de Pasco Mining Company at Cerro de Pasco, via Lima, Peru.

J. W. Metcalf, superintendent for the Southern Pacific lines, has actively taken hold of the fuel oil problem by appointing a number of engineers and firemen in his staff to assist in promoting an economical use of fuel oil on all lines under his control.

Capt. W. D. Peaslee, formerly connected with the department of electrical engineering at the Oregon Agricultural College and a well-known consulting engineer of Portland,

Oregon, has been assigned to the 316th Regiment of Engineers and is now stationed at American Lake. At present he is Battalion Adjutant and Regimental Exchange Officer. The best wishes of the engineering fraternity in the West go with Capt. Peaslee, in his splendid patriotic endeavors.

W. J. Grambs, assistant to the president, and **George Quinan,** chief engineer of the Puget Sound Traction, Light & Power Company, were among the prominent delegates to the Northwest Electric Light & Power Association convention from Western Washington.

G. B. Sanford has assumed the position of district manager for the Great Western Power Company, at Sacramento, Cal., succeeding Boyd Hammon, who has joined the U. S. Signal Corps. Mr. Sanford held a similar position with the power company at Rio Vista.

Paul V. Quick, of Landers, Frary & Clark, has returned to San Francisco after an interesting Eastern trip to his home office, the manufacturers of the "Universal" electric iron in Connecticut. On his return to the West Mr. Quick visited all of the large cities in the Northwest.

Lewis A. McArthur, general manager of the Pacific Power & Light Company, after delivering an excellent paper on salesmanship before the convention of the Northwest Electric Light & Power Association, was forced to return home before the close of the sessions, due to the illness of his wife.

E. W. Lindquist, formerly sales engineer with the mining machinery department of Allis-Chalmers Manufacturing Company, at Chicago, has been appointed the company's Pacific Coast manager to succeed **Fred L. Webster,** who was recently made manager of the Chicago territory.

Ira N. Hollis, president of Worcester Polytechnic Institute and president of the American Society of Mechanical Engineers, expects to visit the Pacific Coast during the latter part of October. The local sections of the four national engineering societies are planning a joint meeting in his honor.

Samuel S. Jaggar of Morrison Electric Company, Portland, and **J. R. Tomlinson** of Pierce-Tomlinson Electric Company, Portland, have been nominated as delegates to the National Contractors Convention, to be held at New Orleans this month. The election is being conducted by the members through the mail.

L. J. Corbett, head of the department of electrical engineering at the University of Idaho, who has been busily engaged in shipbuilding at Seattle during the past several months, for the government emergency fleet, attended the Spokane convention of the Northwest Electric Light & Power Association before returning to Moscow.

Edmund D. Walker, of the British Columbia Electric Railway Company, was an interested attendant at the Spokane convention of the Northwest Electric Light & Power Association. As the official representative to the convention from British Columbia, his presence added a distinctly friendly international flavor to its proceedings.

G. E. McFarland, president of the Pacific Telephone & Telegraph Company, and **J. C. Nowell,** general manager, were in Portland recently for a few hours, en route to American Lake, where they visited Camp Lewis and inspected the elaborate telephone exchange that is being installed at the cantonment. The telephone officials have their headquarters at San Francisco.

F. H. Lane, manager of the department of examinations and reports of H. M. Byllesby & Company, will have temporary charge of the engineering and construction department, succeeding **W. R. Thompson,** now captain in the U. S. Army, located at Battle Creek, Mich., and **A. H. Sayce,** who has joined the second Officers' Reserve Camp and left for Fort Sheridan.

S. M. Kennedy of the Southern California Edison Company, and wife; **E. H. Richardson,** of the Hotpoint Electric Heating Company, and wife and daughter; **Miles Steele,** of the Benjamin Electric Manufacturing Company; **Frank Fagan** and **R. M. Alvord** of the General Electric Company, were among the California representatives at the recent Spokane convention of the Northwest Electric Light & Power Association.

C. S. MacCalla, general manager of the Washington Water Power Company, won the hearts and admiration of all delegates to the Spokane convention of the Northwest Electric Light & Power Association by the masterly manner in which his organization acted as the host for the convention gathering. And in this praise that is heard on all sides a generous share is given to Mrs. MacCalla for her gracious effort in the entertainment of the lady guests.

T. E. Bibbins, president Pacific States Electric Company, headquarters San Francisco, spent a few days at the Seattle office of the company on his return from the convention of the Northwest Electric Light & Power Association and the convention of the Washington Association of Electrical Contractors and Dealers. **H. R. Noack,** in charge of the insulator and pole line hardware sales of the company, also recently spent a few days at the Seattle office on his way back to San Francisco from the conventions.

W. R. Putnam, of the Utah Light & Power Company, threw a new element into the art of appliance salesmanship when he brought out the influence of the "kiddies," and their proper attention, when outlining a campaign for the method electrical at the recent convention of the Northwest Electric Light & Power Association. Mr. Putnam is now home again in Salt Lake City and is busily engaged in boosting the new organization of the Utah Society of Electrical Contractors and Dealers, which is to be formed the first week in October.

F. H. Poss, formerly sales and advertising manager in the central district for the Benjamin Electric Manufacturing Company, has resigned his position and has returned to San Francisco, his former home. He will take up distribution of Avery tractors in the West. **G. B. Weber,** who has been associated with the sales force of the Chicago office for the past seven years, has been made sales manager, while **P. A. Powers,** connected for the past three years with the publicity department, has been made advertising manager of the company.

Chas. A. Sears, general superintendent of the Mississippi River Power Company of Keokuk, Iowa, which operates the largest hydroelectric installation in the world, is a recent visitor in the Northwest. In company with **J. E. Woodbridge** of the Sierra & San Francisco Power Company, **S. J. Lisberger** of the Pacific Gas & Electric Company, **Jos. D. Harrisburger** of the Puget Sound Traction, Light & Power Company, and **Robert Sibley,** editor of the Journal of Electricity, he made a recent visit to the White River plant near Seattle, where the largest water turbines ever built are now being installed and are soon to be put in operation.

J. E. Woodbridge, Sierra & San Francisco Power Company, San Francisco, and the official representative of the Pacific Coast Section N. E. L. A.; **S. J. Lisberger,** Pacific Gas & Electric Company, San Francisco; **T. E. Bibbins,** Pacific States Electric Company, San Francisco; **W. F. Garby,** Automatic Electric Faucet Company, San Francisco; **W. S. Berry,** Western Electric Company, San Francisco; **Garnett Young,** Telephone Electric Equipment Company, San Francisco; **W. C. Wurfel,** Westinghouse Lamp Company, San Francisco; **J. A. Vandegrift,** National Lamp Works, Oakland; **H. R. Noack,** Pacific States Electric Co., San Francisco; **Joe Thompson,** Pacific Electric Manufacturing Company, San Francisco; **W. M. Deming,** business manager Journal of Electricity, San Francisco; and **Robert Sibley,** editor Journal of Electricity, and wife, San Francisco, journeyed from San Francisco to Spokane in a special car to attend the recent Spokane convention of the Northwest Electric Light & Power Association.

MEETING NOTICES FOR ELECTRICAL MEN

(September has proven the banner month of the year for the electrical conventions in the West. On other pages of this issue will be found accounts of the conventions of the Northwest Electric Light & Power Association, the Washington Association of Electrical Contractors & Dealers, the Oregon Association of Contractors & Dealers, and the Utah Society of Electrical Contractors. On this page will be found notices of other meetings of current interest to Engineers throughout the West.—The Editor.)

Joint Meeting of San Francisco Engineering Societies

A joint meeting of the local sections of the American Society of Mechanical Engineers, American Society of Civil Engineers, American Institute of Mining Engineers, American Institute of Electrical Engineers, and American Chemical Society, will be held Thursday, October 25, 1917, at 6:30 p. m., in honor of Dr. Ira N. Hollis, president of the American Society of Mechanical Engineers. An informal dinner will be served, followed by a short talk by a representative of each of the societies on the relation of engineering to the war, and an address by Dr. Hollis on "The Moral Influence of Engineering and Efficiency." The exact location and further details will be announced later. This preliminary announcement is for the purpose of insuring that all engineers will keep the date open.

The Oregon Society of Engineers

The regular meeting of the Oregon Society of Engineers was held in Portland, Oregon, Thursday, Sept. 20, 1917.

Mr. Franklin T. Griffith, president Portland Railway, Light & Power Company, gave a talk on the need of his company for increased transportation revenue. The Society did not go on record as favoring or opposing the increase. As a quorum was not present no business could be transacted.

San Francisco Section A.I.E.E.

Interesting and profitable programs are being prepared for the fall meetings of the San Francisco Section A. I. E. E.

The September meeting of the American Institute of Electrical Engineers is to be held on Friday, September 28th, at 7 p. m., in the room of the Engineers' Club, Mechanics' Institute Building, San Francisco.

As these forms go to press it is announced that J. D. Galloway, chairman of the Committee on Engineering and Inventions of the State Council of Defense, is to speak on the subject of "The Civilian Engineer and the War," and Mr. Frank Rieber of the Rieber Laboratories will speak on the subject of "Engineering Problems of the War." Members of the four national engineering societies have been cordially invited to attend this meeting.

San Francisco Electrical Development & Jovian League

At the meeting of September 12th, Rod G. Guyett, as chairman of the day introduced Milton D. Clark, chief architect of the San Francisco Board of Public Works. Mr. Clark emphasized the pressing needs for additional school facilities in the city and briefly described the plans for new construction. These plans call for the expenditure of $3,500,000 which is to be raised by a proposed bond issue.

On September 19th, Dr. Ng. Pow Chew, editor of Chung Sai Yat Po, was introduced by Milo Hickox. In a most interesting manner Dr. Chew traced the events of the past twenty years which culminated in China's entrance into the present war. He also explained the reasons why China is essentially republican in government and prophesied the stability of the new republic. With regard to what China can do for the allies, he stated that 250,000 Chinese farmers and laborers had already gone to work in France, and more are to follow. There are millions of able bodied men available as soldiers. She also has ten arsenals, four of which are thoroughly up-to-date and in addition has a great abundance of coals, iron and other raw materials. All that is needed is money with which to equip, maintain and transport troops.

September 26th proved to be a most interesting meeting in that W. Hatch, secretary of the Bureau of Visual Instruction, extension division of the University of California, gave an interesting talk on electrical exhibits that have been donated by various manufacturers and are now being sent to various public schools of the state. Pictures of these exhibits are to be found on another page of this issue. The speaker was fittingly introduced by F. M. Boyd of the General Electric Company.

L. H. Newbert, C. E. Heise, D. E. Harris, C. B. Kenuey and Robert Sibley have been appointed a nominating committee to select candidates for officers of the League for the new year commencing in October, 1917, the first named being chairman.

The officers to be elected are president, vice-president, second vice-president, secretary-treasurer and two members of the executive committee. The hold-over members of the executive committee are Messrs. E. E. Brown and H. P. Pitts.

The California Association of Electrical Contractors & Dealers

The quarterly session of the California Association of Electrical Contractors & Dealers is to take place at Fresno, California, October 15 and 16, 1917. A goodly representation is going down from San Francisco and the Los Angeles delegation is expected to be well representive of the industry from that quarter.

Pacific Coast Electrical Supply Jobbers' Association

The quarterly gatherng of the Pacific Coast Electrical Supply Jobbers' Association is to take place at the beautiful

BUILDERS OF THE WEST—XIV.

JOHN D. GALLOWAY

The loyal response of engineers throughout the West to the country's call for national service has proven in full keeping with the splendid traditions of this section of the country. Not only have engineers of the West offered to give of their all in line service, but the effective aid contributed in expert advice for national and state defense and the enthusiasm shown in organizing local home guard organizations has been most marked. To Major John D. Galloway, the noted consulting engineer of San Francisco, this issue of the Journal of electricity is dedicated in appreciation of his excellent work for the United Engineering Council, the State Board of Defense and the measure of enthusiasm he has installed in others to offer their all for the service of the country.

Beverly Hills Hotel situated about half way between Los Angeles and Santa Monica, October 25, 26, 27, 1917. Even at this early date interest is being manifested from many quarters and a goodly attendance is anticipated.

ELECTRICAL CHRISTMAS GIFTS CAMPAIGN

An electrical appliance is one of the most practical gifts that can be made this Christmas. This is a year of stern reality—useful gifts will be the vogue.

With the view to concerted action in selling gifts electrical, the Society for Electrical Development will conduct a great nation-wide campaign this fall. It will take the place of "America's Electrical Week," which will not be held owing to war conditions.

The society will announce its big campaign in a broadside to be mailed to the industry on October 10th. Every central station, and practically all contractor-dealers will be reached, fully 25,000 businesses. A tremendous effort will be made to have the industry present a solid front in merchandising its wares to the Christmas trade.

Following the broadside announcement, about November 1st, an illustrated "how to" booklet will be mailed giving concrete suggestions for selling appliances and how the reader can tie into the great national drive. Members and non-members of the society will be offered attractively designed window lithographs, window cards, window transparencies, poster stamps, etc., without cost. The official design is now being prepared by one of America's great poster artists. It will embody the Christmas spirit—a picture story of the slogan "Give Something Electrical This Christmas."

Soon after this "how to" booklet is mailed, the society will send a portfolio of advertising suggestions for newspaper ads, mailing cards, folders, etc., which can be used by all local electrical interests in backing up their display material.

The campaign is not intended to be as big as either "Electrical Prosperity Week," 1915, or "America's Electrical Week," 1916. It will, however, be a real selling campaign from start to finish. Millions of dollars will be spent for Christmas gifts, mostly useful gifts, during the holiday sales period, November 15 to December 24. The electrical industry has never gotten its share of this business. This campaign will provide the opportunity. The Society is recognized as electrical campaign headquarters and it is to be expected that the big movement this year will have the same splendid co-operative service work that made the two big weeks in 1915 and 1916 so remarkably successful.

BUYING MADE SAFE AND EASY

Does the average person ever stop to think what a safe and easy thing buying has become in our day? What a contrast to the way it used to be within the memory of most of us.

This applies to all buying—of necessities, of luxuries, of everything.

Mr. John Sullivan, secretary of the Association of National Advertisers, in a recent interview said some things on this subject which should interest every buyer in the world. For his words apply to the purchase of anything, from a 5-cent cake of soap up to the most expensive advertised article.

"Today," said Mr. Sullivan, "the housewife sends her little child to make purchases at the corner grocery. She sends her with perfect confidence that, even though a child, she cannot err therein. All that the child needs is explicit instructions to buy THIS or THAT. In the case of all staple produce the price is known, the quality is known and the NAME is known. There is practically nothing about the goods that is unknown. And to be sure of getting exactly what you want, it is only necessary to name the goods."

APPLICATIONS FOR APPROPRIATION OF WATER

Applications for permission to appropriate water have been received by the California Water Commission as follows:

W. H. Metson of San Francisco, 100 cubic feet per second of waters of Grant Line Canal, tributary to the San Joaquin River in San Joaquin County for the irrigation of 1063 acres by means of an intake pipe 24 inches in diameter. The work of diverting the water has been completed at a cost of $10,000.

A. F. Wohlfrom of Colusa, 20 cubic feet per second of waters of Sacramento River for the irrigation of 1266 acres within the Jimeno Rancho in that county. The proposed diversion works consist of a 20-inch centrifugal pump operated by a 75 h.p. motor and a main ditch four miles long. The estimated cost is $11,000.

The Tisdale Irrigation & Drainage Company, a mutual water company, forty second feet of the Sacramento River near Grand Island P. O. in Sutter County for irrigation. Proposed diversion is to be made in two units. What is termed the upper unit consists of an 18 in. centrifugal pump and 75 h.p. gas engine, with 2½ miles of main ditch and the lower unit comprises a 12 in. pump and 40 h.p. engine and a mile of main ditch. The diversion waters 2696 acres and the work has been completed.

F. H. Osgood of Seattle, 125 cubic feet per second of waters of west branch of east fork and east branch of east fork of east fork of Illinois River for the operation of mines in Josephine County, Oregon, by means of a main ditch and flume five miles in length to cost $35,000 and also 125 cubic feet per second of the waters of west fork of the east fork of the Illinois River, by means of a main ditch 9½ miles long to cost $40,000, water also to be used at mines in Oregon.

Jesse B. Holly of San Francisco, 15 cubic feet per second of the regulated flow of Dog Creek, tributary to Truckee River in Sierra County for municipal supply of Reno, Nevada. The proposed works consist of a hydraulic fill storage dam, 110 ft. high, to hold back 23,000 acre feet and a supply pipe line 14 miles in length. The present population of Reno is given as 14,000 and the estimated future requirements of the city as 13,000,000 gallons per day. The estimated cost is placed at $250,000.

HOTPOINT MISSION ART WINDOW DISPLAY

Typical of that section of the country from which comes the product of the Hotpoint Electric Heating Company of Ontario, California, is the unique mission art window display pictured here. The display is being furnished by the Hotpoint Company to its distributors in connection with its fall and winter campaign.

This window display is a three-panel screen three feet high and more than four feet wide. The frame is made of redwood obtained from the famous redwood forests of California. Two carloads of this wood were used in the production of these displays.

The center panel of the display accommodates a 14x21-in. card featuring catchy sales talks on the appliances illustrated in the attractive posters used in the side panels. Eight of these cards are furnished with each display. The name of the dealer is printed just below the selling talk. In the lower right hand corner of the card is shown a beautiful pen and ink sketch of one of the California Missions.

Sixteen attractive posters, lithographed in five colors, are furnished for use in the side panels of the display. Each one depicts the use of Hotpoint appliances in the home. Two of these posters are to be displayed at a time, thus affording eight changes for as many weeks.

With each display is also furnished a set of richly colored mats, harmonizing in color with the posters. These mats are to be used as a covering on the floor of the window, with a display of Hotpoint appliances placed thereon.

HAPPENINGS IN THE INDUSTRY

Threatened Telephone Strike at Portland

The Portland Union No. 125, of the International Brotherhood of Electrical Workers, comprising mainly linemen and inside electricians employed by the Pacific Telephone & Telegraph Company, have taken a secret ballot, similar to that taken in other Coast cities, on the questions of striking should the company not meet the demands for $5 a day by October 21st. Officials of the local said after the ballot there was no doubt the vote was for a strike. Following the ballot the union adopted resolutions calling upon the Central Labor Council of Portland to request the public service commission to investigate the claims of the company that its revenues do not warrant it meeting the demands for increased wages, and if the claims are justified to authorize higher service rates.

Edison Sells to Pasadena

Adopting the identical plan by which the Los Angeles power controversy was settled between the city and the Southern California Edison Company, plans were announced recently by Engineer C. W. Koiner of the municipal lighting plant for the purchase by the city of Pasadena of the Edison system in Pasadena for approximately $500,000.

Under the terms of the contract the Edison system is to be leased to the city for two years, after which the city will purchase it and, as a condition of the sale, will for thirty years purchase power from the Edison Company at wholesale. This plan will permit the use of hydroelectric power and will save the city the necessity of purchasing oil at the present high market for the manufacture of current.

Through the fact that Engineer Koiner was a special representative of the city of Los Angeles during the Los Angeles settlement, he gathered together without expense to the city of Pasadena the data necessary to draw the necessary agreement. In July Koiner was instructed by Commissioner Salisbury to prepare a final report for submission to the commissioners.

In his report made public recently Koiner points out that the settlement planned will remove more than 6000 duplicate poles from the city streets and will eliminate the waste due to competition that has been strangling the growth of the municipal plant. Koiner's report covers the following points:

Value of Edison distributing system in Pasadena, $500,714.79, payable in cash at the end of two years' lease.

The city to agree to purchase power for a period of thirty years, the rates for same to be fixed now for the first ten years and revised every five years thereafter, or, in case of disagreement, to be fixed by the State Railroad Commission.

The Pasadena steam plant to be shut down and operated only as needed, or at the order of the Edison Company.

Pasadena to agree to confine itself to the distribution of electrical energy to the city and to agree to sell to the Edison Company its distributing system outside the city, with some exceptions.

Extensions to both systems during two-year-lease period to be made under contract.

As rental for the company's system Pasadena would pay to the Edison Company an amount equal to 8 per cent per annum on the agreed purchase price and 3.36 per cent per annum to be held by the city as depreciation reserve.

The Edison Company is to assume the unexpired term of lease on its office in Pasadena.

Mr. Koiner stated after the commission met that, in his opinion, this is a much better deal than any the city has ever been offered from the Los Angeles municipal light department, with which Pasadena has been negotiating for some time.

State Commission Can Fix Car Fare

The Public Service Commission of Oregon is vested with full powers to raise or lower street railway rates in the cities of the state, providing that after a full and complete hearing the facts justify such action. Attorney General Brown so advised the commission in an opinion recently.

The opinion was asked for by Commissioner Buchtel to determine to what extent the commission has power to pass upon the application of the Portland Railway, Light & Power Company for an increased fare on its street railway lines.

"It has been the opinion of this office ever since preparing and filing brief in the Supreme Court of Oregon in the Woodburn case, 82 Oregon 114, that the public service commission of this state is vested with the power either to raise or lower street car passenger rates of the various cities of the state, if, after a full and complete hearing, the facts justify such action," said the Attorney-General.

Endorsement of the Shield and Walsh Bills

The Shield and Walsh Bills for the encouragement of hydroelectric development were endorsed at a recent meeting of the chamber of commerce of Stockton, California.

The Walsh Bill deals with development of electric power in the public domains, where the United States is interested simply as a land owner, whereas the Shield Bill deals with the generation of electric current on navigable streams.

Utah Power & Light Company Offers Its Preferred Stock to Customers

In purchasing stock under the extended payment plan offered by the Utah Power & Light Company, the consumer is establishing a savings-investment account, which offers most attractive advantages in that the consumer receives interest on installments paid, at the rate of 6 per cent per annum from date of first payment until final payment is made, when consumer will have delivered to him a certificate for the number of shares purchased and then receive dividends quarterly at the rate of 7 per cent per annum. The adoption of this plan should encourage the savings and investments of small sums of money, which would not otherwise be saved.

During the limited period of the campaign the company is offering to pay to all employes commissions on sales made by employes as follows:

$2.00 for each sale on partial payment plan of one, two, three or four shares;

$3.00 for each sale on cash plan of one, two, three or four shares;

$4.00 for each sale on partial payment plan of five or more shares;

$5.00 for each sale on cash plan of five or more shares. On cash sales, your commission will be paid to you immediately payment is made to us by the purchaser. On partial payment sales, commission will be paid to you when the fourth installment is paid to us.

Four Cent Car Tickets Discontinued

The sale of 25 car tickets for $1.00 has been discontinued by the Puget Sound Traction Light & Power Company in accordance with a decision of the public service commission dismissing the protest of the city of Seattle against the company's tariff supplement which provides for a straight five cent fare. The only exception to the flat rate is that of 2½ cents for school children during the school year which will be continued by order of the commission.

In the contention over the franchise tax on gross earnings the company suffered a legal reverse that will result in the city taking a judgment for $64,387.78, the amount of two

per cent of its gross earnings for 1916. It is understood that an appeal will be taken.

In the matter of the four cent car tickets corporation counsel states that he will ask the Thurston County superior court.

Albany Company Secures 47 New Electric Range Customers

The Albany, Oregon, division of the Oregon Power Company has placed 47 electric ranges during a four months' campaign, and has prospects for a considerable number of additional sales. Contract has been secured with a saw mill adjacent to the company's 11,000 volt line between Corvallis and Philomath covering its electrical energy requirements amounting to 45 horsepower in motors.

Steam Cost May Rise

Application for an increase of approximately 20 per cent in steam heating rates has been filed with the public service commission by the Northwestern Electric Company. The company markets steam, for heating purposes, as a by-product for its electric service. Oil is used to generate the steam, which is metered to consumers. The company's distributing system is confined to the business district.

Technical Schools Appreciate Pacific Coast Section N.E.L.A.

As an instance of the deep appreciation of the Pacific Coast Section N. E. L. A. that is felt by the technical schools and colleges of the West, the stenographic report of the Riverside convention of the Pacific Coast Section, N. E. L. A., bears forceful record. Professor R. W. Sorenson of the electrical engineering department at Throop College of Technology, in closing his remarks in the engineering section discussion, had the following to say:

Prof. R. W. Sorenson: One of the statements which I made this morning was that as a designing engineer I discovered that the power company engineers did not know anything about how to design apparatus, because they always made us change it from the way he wanted to do it. I had in mind another thing that I hoped I would get a chance to say. Since coming to be a teacher and classing myself with those who teach rather than those who do, I have found out that the engineers of the power companies know something after all, particularly in my association with the Pacific Light & Power Corporation, as I spoke this morning. And if the engineers of all power companies can engineer as well as the chief engineer of that power company and his assistants, and the manager of that power company and his assistants can manage, I think I have a good deal more to learn. But the climax has been capped in this meeting. It is the first N. E. L. A. meeting that I have had a chance to attend, and I want to express these few words of appreciation of Throop College and other engineering colleges in general for the privilege which has been given the colleges in uniting not only with the section but with the national N. E. L. A. We have recently received circulars asking us to get in touch with the power companies to find out what we could do for the power companies. It looks to me as though the balance is on the other page and that probably the colleges are going to get more than the power companies. However, it is the policy of the institution which I represent today to do all we can for you. If there is opportunity to serve, we will do it in any capacity, in research lines or in any way in which we may help.

MISCELLANEOUS NEWS NOTES

SEATTLE, WASH.—R. H. Travers, Arcade building, has been awarded the contract for the municipal railway extension at $19,554.43.

JEROME, IDAHO.—The Idaho Power Company is preparing to construct an 80-mile power line from here to Jarbidge, Nevada.

PETALUMA, CAL.—The Presto Electric Company, which a few months ago planned to erect a factory in the old foundry building, will now carry out their plans.

TRACY, CAL.—The directors of the West Side Irrigation District have awarded a contract to the General Electric & Machine Company of Stockton for completing power installation and furnishing seven complete pumping units, at about $60,000.

SALT LAKE CITY, UTAH.—The Utah Power & Light Company is contemplating the construction of a large steam heating plant in Salt Lake City, to cost several hundred thousand dollars. The company already operates three steam plants in the city.

SAN FRANCISCO, CAL.—The Enterprise Electric Novelty Company of New York is opening Pacific Coast headquarters at 706 Sansome street in San Francisco. This company manufactures portable flashlights and batteries and is new on this coast.

SEATTLE, WASH.—Gray & Barash, electrical engineers and contractors, have been granted permits to erect a $4000 warehouse, a $15,000 machine shop and a $1000 office building at 63 Horton street. Improvements are due to a great expansion in their business.

WHITE SALMON, WASH.—It is reported that plans are under way for construction of another large power plant on the White Salmon River by the Northwestern Electric Company between the present power house and Underwood, same to cost about $400,000.

SEATTLE, WASH.—The contract for furnishing meters for the lighting department for the ensuing year were divided as follows: W. R. Hendry & Company, $10,000; Northwestern Supply Company, $10,000; Fobes Supply Company, $7500, all local concerns.

HELIJX, ORE.—The town council has signed a contract with the Pacific Light & Power Company of Portland for lighting the city for a period of five years. The Helix Milling Company will install a 100 h.p. motor in its mill. A transmission line will be erected from Adams to Touchet, via Helix.

SEATTLE, WASH.—Sealed bids will be received by the board of public works up to October 5 at 10 o'clock a. m., room 231 County-City building for about 450 distribution transformers for the city lighting department for the ensuing year. Satisfactory surety bid bond or certified check for $2000 payable to the order of the city comptroller, required with bid.

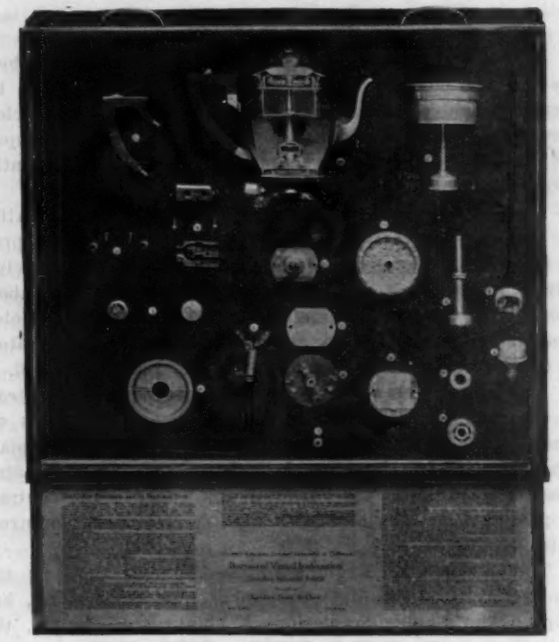
SUSANVILLE, CAL.—In an interview W. L. Wales, chief engineer of the Honey Lake Valley irrigation district, gives the following facts about the project, the completion of which means much to Lassen County: The district comprises 33,150 acres held in small ownerships except in a few instances. It is estimated that a canal of capacity sufficient to carry 390 cubic feet per second will be of ample size and water can be delivered to users by April or May, 1919, as all necessary data is now in the hands of the State Water Commission. It is planned to develop immediately enough water to supply the demands of water users for the next eight or ten years, with all construction and development done in such a way as to allow for completion of the entire project when necessary at a minimum cost. The total cost of the system necessary for the present and, in fact, for about ten years to come, is estimated at $836,479, or $25.20 per acre per year. The ultimate cost of completing the entire project is $1,457,218, or $43.95 an acre per year, which would be the final cost. Data of various projects of the United States reclamation service shows the mean yearly cost of operation to be 36 cents per acre. The report rendered on this district places the cost of operation at 50 cents per acre in order to allow for unforeseen contingents which may arise.

LATEST IN EVERYTHING ELECTRICAL

(Visual instruction has of recent years become a valuable tool for educating both young and old along technical lines. Physical laws and their practical application under proper appeal to the eye become easy of explanation. Below may be found an interesting description of a set of forceful exhibits that have been presented to the University of California by leading manufacturers of electrical ware. These exhibits are shipped under the direction of the University Extension Division to various schools and organizations throughout the state and are proving extremely valuable in disseminating knowledge along electrical lines.—The Editor.)

CALIFORNIA CIRCULATING EDUCATIONAL EXHIBIT

Several electrical concerns are co-operating with the Bureau of Visual Instruction of the Extension Division of the University of California in circulating educational exhibits throughout the public schools of the state. These exhibits are shipped from school to school as requested, each class being required to give definite study to each exhibit. The University has more than one hundred exhibits in its list as furnished to the schools. Requests for exhibits are scheduled so that a school receives only one exhibit at a time for two or three weeks.



Landers, Frary & Clark Exhibit, Illustrating the Electric Coffee Percolator

The electrical exhibits listed include storage batteries by the Edison Storage Battery Company; lamps, motors and ranges by the General Electric Company; irons and vacuum cleaners by the Hot Point Electric Heating Corporation; flash-lights by the Interstate Electric Novelty Company; percolators and irons by Landers Frary & Clark; the telephone by the Pacific Telephone & Telegraph Company, and the telegraph by the Western Union Telegraph Company.

Each exhibit consists of two sheet metal cases about 30 in. square by 9 in. deep. In one case is mounted the various sections of the device and in the other is a display rack for pictures showing how the device is made and used. Each exhibit is also accompanied by descriptive circulars which are given to the pupils by the teacher.

Accompanying illustrations show one of the General Electric Company's exhibits,—"the electric motor, what it is, what it does, how it works, how it is made." One case shows a rotor, stator, bearings and pulley together with a permanent and an electro-magnet to illustrate the princple of the motor's action together with a working model of a motor. The other case contains twenty panels carrying photographs which illustrate the manufacture and use of motors. These include the

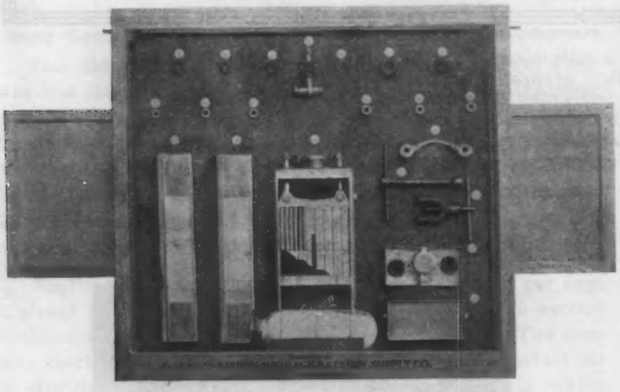
General Electric Exhibit of Electric Motor

making of molds, punching, assembling, winding, finishing and inspection, and applications to various industrial and domestic uses. Similar cases have been devised for the electric range and the electric lamp.

University Extension Division – University of California
Bureau of Visual Instruction
Traveling Industrial Exhibit
The Life of the Electric Motor
The Use of the Electric Motor

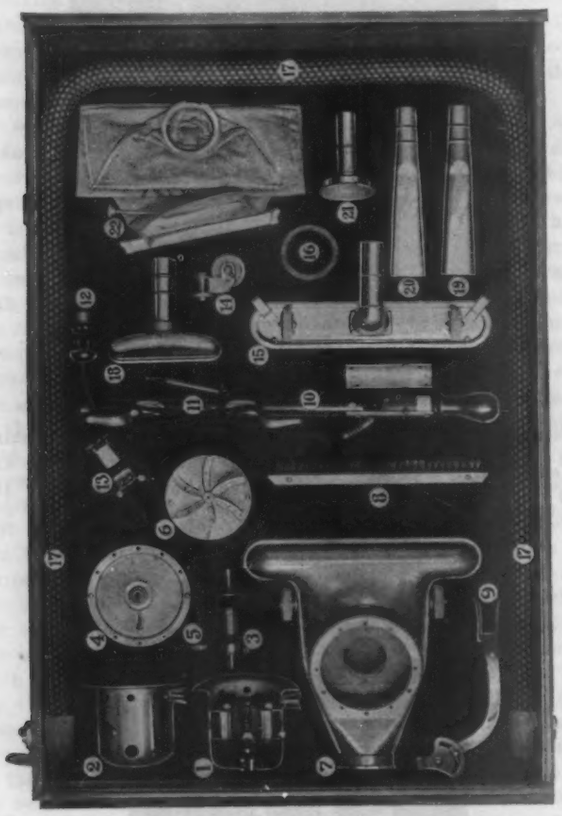
General Electric Exhibit of Manufacture and Use of Electric Motor

The Edison Storage Battery Company's display demonstrates the evolution of the battery from carbon steel ribbon to finished product. Samples of the carbon steel ribbon



Edison Storage Battery Company Exhibit

b'ank, the perforated strip, the nickel-plated, the appearance when pressed into halves, the assembly of the halves, and the loaded pocket, are shown for the negative element. Likewise for the positive tube. The method of mounting and form of container are shown in detail.



The Hotpoint Electric Heating Company's Exhibit of Vacuum Heaters

The Hotpoint vacuum cleaner exhibit shows the essential parts, manner of assembling and general operation. These include the exterior and interior of the motor casing, the armature, bearing plate, motor brush, fan, cleaner body, floor brush yoke, floor brush, switch-handle and attachments. All of these are explained in detail as to construction and operation in the literature accompanying the exhibit.

PICTURES OF FIGURES

A remarkably interesting pamphlet has just been published by the LaSalle Extens on University of Chicago, on "Graphic Charts for the Business Man." It is the work of Stephen Gilman, C. P. A., vice-president of the Tanner-Gilman Company, public accountants.

The entire subject is only in its infancy, and it may reasonably be expected that the art will be developed very extensively within the next decade.

Besides a clear account of the whole process of graph making, this booklet contains 56 examples of graphs, from the simplest forms to highly elaborate charts. They include records of manufacturing costs, production, business organization, flow of materials, salaries of employees, net profits, relation of stock market to business activity, salesmen's productivity, sales, responses to advertisements, geographical distribution of customers, collections, relation of assets to liabilities, shipments, cash balances, time studies, idle time, traffic, bank deposits, complaints, telephone service, and many other things. These charts are so selected as to illustrate all the principal varieties of graphs in use at the present time.

The pamphlet has been prepared for use in the Business Administration Course of the LaSalle Extension University.

TRADE NOTES

The General Electric Company, Portland, has been awarded the contract for equipment to be installed on the Interstate bridge, made necessary through lack of sufficient current in present generating system to operate the lift span. The contract of the company amounts to $5200 and the entire system will cost about $7500.

Arrow Electric Company, 1627 Fourth avenue, Seattle, has closed a contract with the city for converting the present two wire trolley system on Division "A" of the municipal railway lines into a single wire system at a cost of about $5500. The company has also closed a contract for electrical installations in the addition to the grain elevators for the Port of Seattle Commission, amounting to $2240.

Fairbanks, Morse Company was awarded the contract for the major portion of the equipment, including gas engines, exciter sets and storage tanks at $9380 for light plant to be installed by the city in Harlem, Mont. The Electric Construction Company of St. Paul was awarded the contract for pole line and switchboard, also commercial and street lighting circuits.

The Associated Engineering & Supply Company the manufacturers of the Mint System of Fuel Oil Control, has equipped the Santa Fe stationary plant at Richmond, the Santa Fe ferry boats "San Pedro" and "San Pablo," and the tugs "Richmond" and "Ripley." The tug "Payson" has been equipped for six months and as a result of the excellent showing of this tug the other equipment is being installed. A similar equipment at the Palace Hotel in San Francisco and Peet Bros.' Soap Works, at Berkeley, have also just been completed.

NePage, McKenny Company, Armour building, Seattle, electrical engineers and contractors, having offices at Seattle, Portland, San Francisco and Oakland, report contract for complete electrical equipment in ten 9400-ton steel steamships being constructed for the United States government by Moore & Scott, shipbuilders of San Francisco, the contract for this work being secured through the San Francisco office. They also reported that the Portland office has secured a contract for the electrical equipment in ten wooden ships being constructed at Portland by the Supple & Ballin Shipbuilding Corporation. They also have the contract for equipping practically all of these wooden vessels with electrical steering gear.

NEW BOOKS AND BULLETINS FOR ENGINEERS

The Electron

By Robt. A. Milliken, professor of physics, University of Chicago Press, Chicago, Ill., and for sale by Technical Book Shop, San Francisco. Price $1.50.

The favorite introduction to electrical texts a decade ago was "we do not know what electricity is,—we can merely study its effects." But recently scientists have come perilously near to answering the question of the ultimate nature of electricity. Foremost among these has been the author of this little book whose classic experiments on the isolation and measurement of the electron has blazed a trail for those who follow. Herein he marshals a great array of evidence for the atomic structure of electricity, describes some of the electron's most significant properties, and their bearing on the structure of matter and the nature of electromagnetic relations. In so doing he traces the work of early investigations as well as those of the present day, including full details of his own experiments. He comes to the conclusion that an electric current "is the passage of a definite material, granular substance along the conductor," this substance being the electron. In other words it indicates that electricity and matter are merely different aspects of one and the same thing. The text will prove intensely interesting to even the layman and exceedingly valuable to the technical man.

Electrical Measurements

By Frank A. Laws, professor of electrical engineering, Massachusetts Institute of Technology and Harvard University; size 6 by 9 in; 719 pp.; published by McGraw-Hill Book Co., New York City, and for sale by Technical Book Shop, San Francisco. Price $5.00.

Lord Kelvin once wrote "when you can measure what you are speaking about and express it in numbers, you know something about it." Based on this criterion and judging from Prof. Laws' exhaustive account of how electricity is measured, a great deal is known about electricity. Instruments for the measurement of current, electrostatic quantity, resistance, electromotive force, power, inductance capacity, watt-hours, phase, power factor, frequency, synchronism, and wave form, from the most primitive to the most sensitive, for refined laboratory practice and rough-and-ready field use, are completely illustrated and described. The treatment is essentially theoretical and mathematical, or at least involes a good technical grounding in order to be read understandingly. For the college student it is the most comprehensive text which has come to our attention.

Practical Electrical Illumination

By Terrell Croft, consulting engineer; 225 pp.; 5½ by 8 in; published by McGraw-Hill Book Company, New York City, and for sale by Technical Book Shop, San Francisco. Price $2.00.

This book is based on the excellent idea that the man who designs and installs a lighting system ought to know something about light. So in a simple, though crude manner the author explains, in terms of the electron theory, how light is produced, how it acts and how it is directed and controlled. He then describes the several types of electric lamps and gives an excellent exposition of the theory of illumination design. The application of these principles to all kinds of installations, both interior and exterior, is then illustrated and described in detail. The book is a judicious compilation of widely scattered information adapted to the understanding of an electrical contractor.

THE WESTERN ELECTRIC 1918 YEAR BOOK

The Western Electric Company, which, three years ago established a new mark among jobbers by announcing that it would issue its supply catalog every year, once again scores as a pioneer by publishing its 1918 year book in the early fall of 1917.

Two reasons are given by the company in connection with this announcement. The first is that because of the popularity which its year book has attained, the entire supply of 1917 books is already exhausted. In the second place, from many quarters there arose a demand for a book to be published early in September which could thus be used by buyers in placing their requisitions for fall and winter stocks.

The new 1918 year book which is now being distributed to the trade follows the plan of uniform list price and basic discount inaugurated by the Western Electric Company three years ago. In addition, manufacturers' list prices are shown on certain standard lines for the convenience of any who prefer to buy on the manufacturers' discount, or who desire an independent means of checking invoices.

Another feature of the book which is unique among all jobbers' electrical supply catalogs is the first section of 16 pages following the index, devoted to a listing of the company's extensive line of printing plates, window displays, stuffers, lantern slides and other forms of assistance for dealers handling Western Electric appliances.

The book consists in all of 1160 pages and contains more than 50,000 items. It is what it purports to be, a real hand book of electrical supplies.

Miscellaneous Bulletins

The General Electric Company has published a 10-page index to descriptive bulletins and sheets, and a 14-page index to supply part bulletins. These greatly facilitate the use of the information supplied by this company.

The Form Q Inductive Motor, 2 and 3-phase squirrel cage type, 60 cycle, 1300 h.p. is the subject of Bulletin No. 180 for the Crocker-Wheeler Company. Details of construction are strongly emphasized therein.

The Engineering Department of the Society for Electrical Development has published Part I of its series on Industrial Heating as a Central Station Load. "The Utilization of the Heat of Electric Energy," Part I traced the evolution of the electric furnace and Part II illustrates and describes various heating appliances and their industrial application.

James E. Allison, Security Building, St. Louis, has published a 155 pp. pamphlet severely criticizing the doctrine of 'theoretical depreciation" as resulting in a virtual confiscation of utility properties. This paper was presented by the Consolidated Gas Company of New York for the N. Y. Public Service Commission and constitutes a critical analysis of a paper on "Accounting for Depreciation," by Dr. Weber, the commission's statistician.

The Tenth Annual Report of the Public Service Commission of Oregon contains a record of the commission's activities during 1916. Of special interest is the investigation of the rates of the Portland Railway Light & Power Company, which fills 60 pages of the report. Financial statements of all utilities in the state are given.

"American Sea Power" is the subject of a series of editorials in the N. Y. Evening Mail which have been reprinted in book form for convenient use. The slogan is American control of oil, ships and a merchant marine.

Report of the Committee on Petroleum, California State Council of Defense, 191 pp., 6 by 9 in., 41 plates, presents a comprehensive survey of the fuel oil situation throughout the world with detailed reference to production, transportation, refining and utilization of California oil. Definite recommendations are made for meeting the threatened deficit.

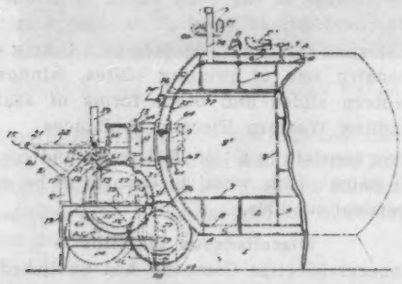
"Light Projection: Its Application," is the subject of Bulletin 32 from the Engineering Department National Lamp Works of General Electric Company by E. J. Edwards and H. H. Magdsick, being one of the papers presented at a course of lectures on illuminating engineering at the University of Pennsylvania during the fall of 1916.

WHAT WESTERN INVENTORS ARE DOING

(Recent months have witnessed many articles of manufacture that make use of luminous effects for dark periods of the day. Watches, for instance, are appearing on the market with hands that appear luminous in a dark room. Below is a recent invention of an electric push button, designed to attain similar results. Other interesting briefs are an apparatus for generating power, a steam generator, a centrifugal oil-burner, and a dynamo-electric machine which follow.—The Editor.)

1,236,020. **Apparatus for Generating Power.** Washington B. Vanderlip, Oakland, Cal.

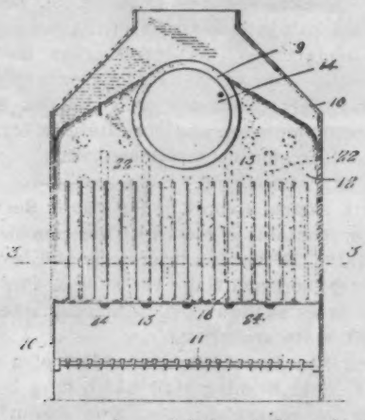
An apparatus for producing power comprising a pressure accumulating and storage chamber, a barrel opening thereinto and provided with a firing chamber, means for inter-



mittently positioning cartridges containing explosive charges within said firing chamber, means for successively exploding said positioned cartridges, means for ejecting the exploded cartridges, a check valve intermediate the firing chamber and said pressure accumulating chamber and seated by the accumulated pressure within said chamber, and a valve-controlled outlet within said chamber for releasing the accumulated pressure therefrom.

1,235,764. **Steam Generator.** Edward V. Brown, Los Angeles, Cal.

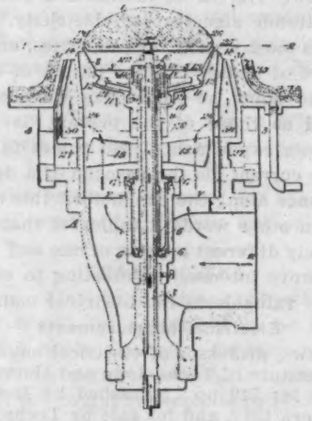
A steam generator comprising a plurality of flat hollow sections having registering intercommunicating openings



through their upper ends and being independently closed at their lower ends, said sections also having interlocking flanges about the openings, and header secured over the openings of the end sections.

1,236,073. **Centrifugal Oil Burner.** Milton A. Fesler, Oakland, Cal., assignor to Fess System Co., San Francisco, Cal., a corporation of California.

A centrifugal oil burner having means for the circumferential distribution of an annular oil stream, means for supplying a blast of air above and below said oil stream, means operated by said blast of air to rotate said oil distributing means, and means to vary the volume of air delivered to said oil stream without varying the speed of the oil distributing means.



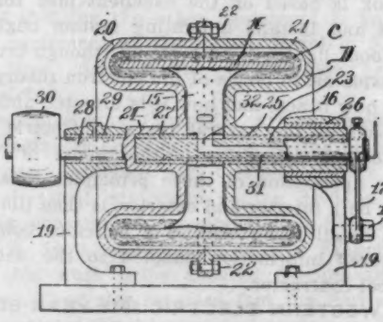
1,235,788. **Electric Push-Button.** Maxwell C. Frank, Piedmont, Cal.

As a new article of manufacture, a button comprising a hollow transparent body having an annular basal bearing

flange formed integrally thereon, layers of luminous powder within said body and a washer adapted to hold said luminous powder therein.

1,236,309. **Dynamo-Electric Machine.** Louis Frank Johnson, San Gabriel, Cal., assignor, by mesne assignments, to Power Developing Company, a corporation of Arizona.

An induction motor, comprising, in combination, a field having a stationary core and an inducing winding thereon, and a rotor having a sectional incasement of conductive



material entirely inclosing and arranged to be rotatably influenced by said field, each of the sections of said rotor having an inwardly extending member journaled to revolubly support said rotor.

NEW ELECTRICAL DEVELOPMENTS

(Two interesting new electrical developments are now being followed by engineers of the West—the one the new installation of the Pacific Gas & Electric Company near the Spaulding Dam and the other the additional power unit that is being installed for the White River Plant of the Puget Sound Traction, Light & Power Company near Seattle. The former is interesting in that a variable head for power generation is made use of, while in the latter instance a new world's record is to be established in size of water wheel design as a total wheel capacity of 23,000 h.p. is accomplished. Other items of electrical development may be found in the following notations.—The Editor.)

FINANCIAL

SAN FRANCISCO, CAL.—The board of directors of the Pacific Gas & Electric Company has declared the regular quarterly dividend of $1.25 a share on the common stock of the corporation, payable October 15th, on stock of record September 30th.

SAN FRANCISCO, CAL.—The San Joaquin Light and Power Corporation has sold the issue of $750,000 of first and refunding 6 per cent bonds recently authorized by the Railroad Commission to Girvin & Miller of San Francisco and Torrance, Marshall & Company of Los Angeles.

SEATTLE, WASH.—Bids are being received by the city comptroller of Seattle for the purpose of each or both of the following bond issues: $350,000 water extension bonds, maturing in equal series, 11 to 20 years; $390,000 light and power plant bonds, maturing in equal series, 6 to 20 years. Bonds to be dated October 1, 1917. Rate of interest will be either 5 or 5½ per cent.

SAN FRANCISCO, CAL.—News has reached this city that the Los Angeles Trust & Savings Bank had purchased $1,000,000 of the $1,600,000 5 per cent bonds of the Imperial Irrigation District. It is understood that the Pacific Mutual Life Insurance Company and the First National Bank of Los Angeles were associated with the Los Angeles Trust & Savings Bank in the purchase.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company common stock broke sharply Thursday in New York, with 41 bid and 44 asked, as the final quotations for the day. In the local board this stock, which sold last week at 54 and better, displayed pronounced weakness. Frank G. Drum, president of the Pacific Gas & Electric Company, asked with reference to the remarkable decline which this stock has experienced in the last few days, said "All equipment and material used by gas and electric companies have increased amazingly in price of late. Wages, too, are higher, and labor, especially skilled labor, is difficult to obtain and hard to keep. Fuel oil, too which cuts a big figure in our gas business, has doubled in price."

SEATTLE, WASH.—Bids have been opened in the city comptroller's office on the $390,000 light bonds and $350,000 water bonds. Only one firm submitted bids on all issues, John E. Price & Company and the highest offer was 96.55, with 5 per cent interest. The light bonds were for extension of the Cedar River system and the water bonds for the new steam unit at Lake Union. Will H. Hanna, chairman of the finance committee of the city council will probably be joined by L. B. Young, superintendent of water; J. D. Ross, superintendent of lighting, and H. W. Carroll, city comptroller, in recommending to the city council Monday the rejection of all bids for the light and water extension bonds. The failure to sell these bonds will probably result in the city going on a warrant basis until next spring.

INCORPORATIONS

PORTLAND, ORE.—The Sherman County Light & Power Company has been incorporated here.

OGDEN, UTAH.—Articles of incorporation have been filed by the Automatic Controller & Manufacturing Company and the following officers have been chosen: Cleveland Redfield, president; J. W. O'Brien, vice-president; Thos. L. Whitehill, treasurer; Wm. J. Stone secretary. The purpose of the company is to manufacture electrically operated mechanical devices. It is the purpose of the company to build a factory in Ogden.

TRANSMISSION

OATMAN, ARIZ.—In order to facilitate work at the Gold Ore property a power line will be run to the mine, and a complete electric plant will be installed.

LOS ANGELES, CAL.—Bids will be received by the board of supervisors of Los Angeles County up to September 24th for the erection of a power house at the county hospital.

PORTLAND, ORE.—At a special meeting of the Interstate Bridge Commission a few days ago, it was decided to purchase additional electrical equipment to facilitate the operation of the lift span on the new interstate bridge.

PITTSBURG, CAL.—The Great Western Power Company has purchased 14 acres from the Muir estate near Valona, where they have started excavating for one of the largest outdoor type substations in the west. Expenditures at Valona will aggregate $100,000.

EVERETT, WASH.—The city council has completed a business deal by which Everett has acquired a power site in the Sultan basin, which, according to engineers, can be developed to furnish sufficient power for the use of the city for a long period of time.

TAFT, CAL.—The San Joaquin Light & Power Company, in its efforts to accommodate oil operators with light and power throughout the West Side district, is now building seven miles of line to supply the Reward and Union Oil companies in the Canarris neighborhood. Manager J. B. Carter is in charge of the installation.

CRESCENT MILLS, CAL.—The Great Western Power Company has completed a high power line from Las Plumas to Veramount station on the line of the Indian Valley Railroad. The line will supply power to mines in the vicinity of Crescent Mills. It also will serve as an auxiliary power for Engle's copper mine during the winter months.

SAN FRANCISCO, CAL.—The annual meeting of the Sierra & San Francisco Power Company was postponed for lack of a quorum. The postponed meeting will be held on the second Monday in October, when the annual report will be submitted. The annual meeting of the Coast Valleys Gas & Electric Company was postponed until October 10th.

WHITE SALMON, WASH.—Plans are under way for the building of another large power plant on the White Salmon River by the Northwestern Electric Company, between the present plant and Underwood. It is understood that construction work will soon be started. The plant is to cost about $400,000. The right of way for the pipe line is being purchased.

OAKLAND, CAL.—Although holding more than $3,000,000 worth of stocks and bonds in the Sierra & San Francisco Power Company as security on a $25,000 note, William Bayley has not been able to collect the money, he alleges in a complaint against the company and its board of directors,

which he filed in Oakland. Bayley asks for the sale of property in order to raise the amount due on the note.

PHOENIX, ARIZ.—The city council is asking for bids on a frenquency changer for the gas plant. This will cost in the neighborhood of $10,000 and will add greatly to the capacity of the plant. The council, in asking that the town vote bonds in the sum of $125,000 for the purchase of the plant was taking into consideration the necessary enlargement of the service.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company has decided to put in chain grates and automatic stokers in the steam electric power plant at Georgetown, in which to burn ordinary coal instead of oil. This equipment on this plant will cost between $200,000 and $250,000. About the same expense will be involved in the enlargement of the plant on Western avenue.

AZUSA, CAL.—Another power project is being planned for the San Gabriel Canyon by the United Light & Power Company of Los Angeles. G. W. Gilbreth, an engineer for the company, was in the city conferring with engineers who are making a preliminary survey for the dam site. The plant will cost $500,000 and will provide 6000 kilowatts. Later the company expects to put in another dam and treble the size of the plant.

CARSON CITY, NEV.—A franchise for the establishing of a power transmission line was granted by the board of county commissioners of Storey County to the Nevada Valleys Power Company, which proposes to erect a plant to cost approximately $300,000 in Storey County near the McCarran ranch on the Truckee River. From that point power will be distributed to the entire western portion of Nevada, and may extend to other adjacent fields, if conditions warrant.

SACRAMENTO, CAL.—Agents of the Great Western Power Company have been in Sacramento the past few weeks buying strips of land to enlarge their right-of-way. It is the purpose of the company to add 34 ft. to its right-of-way, which is at present 50 ft. wide, from the site of the power plant in Big Meadows to the Bay region. As soon as the rights-of-way are purchased it is understood that the company will construct another power line, paralleling its present lines, from its generating plant of San Francisco. In most instances property owners are willing to give up the narrow strip on the company's terms.

LOS ANGELES, CAL.—Contemplating the development of 22,000 h.p. electric energy, the United Light & Power Company, with headquarters here, expects to start work within 30 days on a project that will mean the construction of a big dam at the mouth of the Prairie Fork, in upper San Gabriel Canyon, and the building of two immense power plants. The dam, which will be of concrete of Eastwood type will be 200 ft. high, 50 ft. at the top and 100 ft. wide at the bottom. The first power plant will have a drop of 1,248 ft. and will develop 8000 h.p. From it will run a power sluice, 6 miles long, with a drop of 1818 ft. to the second power house, where 14,000 h.p. will be developed. G. W. Gilbreth and F. C. Riley are owners of the concern. By construction of 7.7 miles of transmission line it will be possible to connect with any important electric company of Southern California. The total cost of the project is figured at $2,000,000. G. O. Newman is chief engineer of the company.

TRANSPORTATION

SAN FRANCISCO, CAL.—The contract has been awarded to the U. S. Steel Company, the lowest bidder for furnishing track special work for the Municipal Railway System.

SAN BERNARDINO, CAL.—The Pacific Electric Railway Company is to operate an auto-bus service between San Bernardino, Patton, Highland and intermediate points, San Bernardino County.

SAN FRANCISCO, CAL.—In a letter sent to the supervisors by the Ocean Shore Railroad a change in the company's franchise is proposed to give the railroad the right to use motor cars instead of electricity.

SEATTLE, WASH.—Bids are being received by the board of public works of the city of Seattle for the improvement of Division "A" of the Municipal Street Railway by constructing a trestle approach on Thorndyke avenue.

SAN FRANCISCO, CAL.—The contract for the construction of outer tracks for the Municipal Railway from Van Ness avenue to Castro street, on Market, was let by the board of works to James M. Smith for $36,959.78.

LOS ANGELES, CAL.—The West Jefferson Improvement Association has petitioned the city council to compel the Los Angeles Railway Company to extend the West Jefferson car line from Fourth avenue to Ninth avenue.

OAKLAND, CAL.—The city council has requested the San Francisco-Oakland Terminal Railway Company to install modern improvements on its various lines about the city. Improvements by the company will be made on College avenue and West Sixteenth street.

STOCKTON, CAL.—The Central California Traction Company has granted an increase of wages as urged by its employes. An increase of 3½ cents per hour to passenger conductors, motormen and brakemen is allowed, and 5 cents to freight conductors and brakemen.

SANTA ANA, CAL.—An ordinance has been adopted by the board of supervisors granting to the Pacific Electric Railway Company a franchise to construct and for 50 years maintain an electric railroad along and across certain public roads and highways in Orange County.

PHOENIX, CAL.—A project embodying the construction of an electric railroad through three states, opening of one of the largest coal fields in the United States, has been submitted to the Arizona Corporation Commission for approval and authority to organize and transact business.

OAKLAND, CAL.—General Manager W. R. Alberger of the San Francisco and Oakland Terminal Railway, in a communication to the city council, outlined the proposed plans of the company for improving the car tracks on Telegraph avenue, College avenue and West Sixteenth street.

ORANGE, CAL.—An ordinance has been adopted by the board of supervisors granting to the Pacific Electric Railway Company a franchise granting the right to construct and for 50 years maintain an electric railroad over and across certain public roads and highways in the county of Orange.

YUCAIPA CAL.—It has been announced that the Pacific Electric Company will extend its line from Redlands to Yucaipa at once. If materials can be secured and deliveries are assured it will start work in a few weeks so that the line can be completed by time crops are ready to move next summer. The line will be 13 miles long.

SAWTELLE, CAL.—Within 30 days the Pacific Electric Railway Company will begin the improvement of its roadbed, on the Santa Monica line through Sawtelle, with new ties, new and heavier rails, rock ballasting and oil macadam paving. An investment of about $140,000 will be made. The improvement will cover a distance of about 9000 ft.

COLVILLE, WASH.—A petition has been presented to the board of county commissioners of Stevens County, Washington for a franchise to the Northport Power & Light Company, to construct an electric transmission line for light, heat and power over the Rossland road, from the international boundary line to the city of Northport, Stevens County, Wash.

REDLANDS, CAL.—The Pacific Electric Railway is to build into Yucaipa Valley. A definite decision to that effect has been arrived at and the route to the crest of the hills, where the paved roads to Yucaipa and Beaumont branch has been determined. Surveyors were in the valley for five

months, since last November, and they ran four lines through the hills, finally securing a grade that does not exceed two and one-half per cent. Traffic Manager Pontius says the road will be built.

SANTA ANA, CAL.—Engineers for the Pacific Electric Company have submitted a plan for extending the line into Tustin to members of the city council. According to the revised plan the Pacific Electric will go out East Second street on the Southern Pacific tracks, will curve back of the collar factory toward Evergreen, will cross that street to First, cross that street curving across Minnie and Pine, will curve back again to Pinal Dome building, until it hits the Southern Pacific right-of-way at Walnut.

SAN FRANCISCO, CAL.—The official financial report of the Municipal Railway of San Francisco for the fiscal year ended June 30, 1917, has not yet been completed, but unofficial figures obtained from Bookkeeper Scott indicate that the year's business will show an actual profit of $42,855. This is a smaller showing than for the preceding year, when there was a net profit of $74,767, but the decrease is explainable by the fact that in the fiscal year 1915-1916 the Exposition was at its height, and the Municipal Railway was enjoying its greatest income from that source.

LOS ANGELES, CAL.—Extensions of two car lines of the Los Angeles Railways Company system have been recommended to the city council by the public utilities committee. One was the West Jefferson Street line, which it is proposed to extend from the present terminus at Fourth avenue to a new one at Ninth avenue. The other extension was that of the South Park Avenue line from Slauson to Manchester avenue. In each case the committee held that the request of the committees petitioning for the improvment was reasonable and the matter was passed along to the board of public utilities for action.

ILLUMINATION.

HANFORD, CAL.—The city trustees have passed a resolution of intention to give Hanford's down town district an electrolier lighting system.

LIVINGSTON, CAL.—The supervisors have called a special election to vote upon the matter of the formation of a lighting district in Livingston.

SUMPTER, ORE.—According to Robert E, Strahorn, who is the head of the Sumpter Power & Water Company, the electric plant will be rebuilt at once.

LOS ANGELES, CAL.—Paving the way for better lighting in the vicinity of Culver City and Westgate, the city council has created the Culver City Lighting District.

SANTA ANA, CAL.—An election will be held on October 11th for the purpose of determining the question of the formation of the Tustin Lighting District of Orange County.

GARDEN GROVE, CAL.—An election will be held October 11th for the purpose of determining the question of the formation of the Garden Grove Lighting District of Orange County.

MOJAVE, CAL.—An election will be held here on October 6th for voting for or against the Mojave Lighting District, which is to be formed from the south half of section 8 and all of section 17, except certain parts.

NAPA, CAL.—Bids have been opened to supply the city with 350-80 candlepower lights as follows: H. Schwartz Co., $1.06 per lamp; Winship Beard Co., $1.00 per lamp; Earl Wilson, 98c per lamp. The contract was awarded to Mr. Wilson.

CHICO, CAL.—The board of city trustees has authorized the city to advertise for bids to furnish the city with light and power for a period of three years, intersection lights for the residence section and power for the electrolier system.

LOS ANGELES, CAL.—Notice is given that the city council adopted an ordinance of intention to order necessary appliances to be installed on North Broadway between California and First street and on Broadway between First and Tenth.

FRESNO, CAL.—At a meeting of the directors of the Sierra Chatauqua Association held a short time ago, plans for next year were considered. Among the improvements are: to have the San Joaquin Light & Power Company light the Chautauqua grounds with electricity.

WATTS, CAL.—The board of trustees have ordered the improvement of a portion of Main and other streets by the construction of ornamental electric light standards with the necessary conduits, wires and other appurtenances, in accordance with plans and specifications on file with the city engineer and city clerk.

PENDLETON, ORE.—At a special meeting of the city council a new street lighting contract was made with the Pacific Power & Light Company for a period of 5 years. Instead of arc lights, Mazda electric lamps will be installed. The lamps will be 400 and 600 candlepower on the business streets and 350 candlepower in the residence sections.

VICTORVILLE, CAL.—Improvements of considerable magnitude started by the Southern Sierras Power Company in this county. A new line is to be built from the substation west of Barstow, a distance of 41 miles. The new line will require in the neighborhood of 60 days for construction work will represent an investment on the part of the company of about $115,000.

WATSONVILLE CAL.—This city has been offered a new system for street lighting. The Coast Counties Gas & Electric Company has made a proposition to the board of aldermen to expend the sum of $5000 in installing 142 of these new lights if the city will pay a monthly light bill. It is planned by the company to install 80-80 watt lights 37-100 watt lamps and 25 of the 250 watt variety.

SACRAMENTO, CAL.—A rehearing has been granted by the Third District Court of Appeal in the case of the town of Suisun against the Pacific Gas & Electric Company. The original action was brought by Suisun to compel the corporation to pay a tax on its franchise. The court held the company was entitled to a lighting franchise under the state constitution and that such franchise was exempt from taxation by municipalities. Recently, however, the Appellate Court's attention has been called to a Supreme Court decision in which it is held that both power and lighting franchises are taxable; hence, the granting of the rehearing.

PORTLAND, ORE.—What is considered as the most significant lease deal and building improvement plan put forward in Portland for many months materialized when William C. Alvord, manager of the Henry Failing estate, announced that he had leased space on the four lower floors of the twelve-story class A building at the southeast corner of Fifth and Alder streets, and that he had ordered alterations and improvements in the building that will cost probably about $200,000. Under the new arrangements the vacant portion of the lower floor, all of the second and third floors, and most of the space on the fourth floor will be occupied, commencing January 1st by the consolidated offices of the Pacific Power & Light Company and its subsidiary concerns, the Portland Gas & Coke Company and the Walla Walla Railway Company.

TELEPHONE AND TELEGRAPH

SAN FRANCISCO, CAL.—The Asher Electrical Company, of which Jefferson Asher is the head, received the contract to install electrical equipment consisting of telephone poles and transmission lines, at Angel Island.

OAKDALE, CAL.—Plans are now being made by the Pacific Telephone & Telegraph Company for the construction of a new line between Oakdale and Modesto. The new line will be built to handle toll business.

GLENDALE, CAL.—J. Downey Company of San Francisco, has been awarded the contract for the construction of Sunset Telephone building, to be erected in Glendale.

BLYTHE, CAL.—Installation of telephone service in the valley will be put through to completion as fast as possible, it is stated. Excavation work for the exchange building has been started.

RIVERSIDE, CAL.—The long-promised consolidation of the two local telephone sytems has become a reality. Local officials of the Pacific Telephone and Telegraph Company, which some months ago concluded the purchase of the Home system, have announced that the two systems are connected up.

LOS ANGELES, CAL.—The Western Union Telegraph Company has taken over the telegraphic service along the line of the Tonopah and Tidewater Railroad. The service now reaches beyond Ludlow to Death Valley Junction, Silver Lake, Tecop and Zazriskie, Cal., and further connections to Ryan, Riggs, Shoshone, Acme, Cal., and Pahrump, Nev.

OROVILLE, WASH.—The Okoncgan Valley Power Co. has made application to the town council of Oroville for a franchise to erect and maintain poles, wires, conduits and other necessary appliances and conductors for the transmission of electricity for lighting, heating and power purposes in the town of Oroville Wash. A hearing will be held early in October.

STOCKTON, CAL.—Stockton's growth is responsible for an appropriation by the Pacific Telephone and Telegraph Company of $59,920 for an additional phantom circuit between Sacramento and Stockton, for additional equipment in the central office, for an improvement in the service between Stockton and Fresno, and for new toll circuits at various points in the Stockton-Fresno division.

LOS ANGELES, CAL.—To improve service in Southern California, the Pacific Telephone and Telegraph Company has set aside $200,000 for purchase of additional equipment and improvement of its present paraphernalia. Principal improvements are as follows: Glendale, central office, $77,410; copper circuit between Campo and El Centro, $38,020; copper circuit between San Diego and Campbell, $30,080; trunk cables between Ocean Beach and San Diego, $15,090; various improvements at Orange, $9,200; pole lines between Los Angeles, Whittier and Artesia, $9,240; rerouting line between Redondo and Redondo Junction, $7,150; construction work in Ocean Beach, $3,880; poles and cables at Orange, $1,430; remodeling plant at Ocean Beach, $2,360; construction work, Kern County line to Bakersfield, $2,440; circuits between Torrance and Los Angeles, $2,110; cable work at Brawley, $670; magneto switchboard at Calexico, $570.

IRRIGATION

MEDFORD, ORE.—By a vote of more than 2 to 1, the ranchers in the vicinity of Medford voted in favor of establishing an irrigation district.

VICTORVILLE, CAL.—Notice has been given that an election will be held in Victor Valley Irrigation District, October 1, to determine whether or not such a district shall be organized.

KLAMATH FALLS, ORE.—Reports of another projected irrigation unit for the Klamath reclamation service here has been made by H. M. Stastney of Malin, who operates a dry land ranch in that vicinity and is most anxious to become one of the irrigated farmers as soon as possible.

PHOENIX, ARIZ.—The stockholders of the River Valley Water Users' Association have voted in favor of amending articles of incorporation, so that care, operation and maintenance of the project under Roosevelt Dam can be taken over by them. A few changes of organization will be made.

ORLAND, CAL.—Directors of the Orland Unit Water Users' Association have voted down the proposition to allow water to be furnished from the Orland Project supply for irrigation upon the Anchorage Farm, outside the project, at least until such time as it shall have demonstrated that there is a surplus which can be safely used for such purpose.

REDDING, CAL.—Directors of the Happy Valley irrigation district have decided to issue $300,000 worth of bonds to build the Missellbach dam and the Hoover Creek tunnel. Stockholders and directors have agreed this be done and Attorney Francis Carr, who has steered the farmers safely through their troubles of the past year, now is drawing up an application to the State Railroad Commission for approval of the plant.

OAKDALE, CAL.—The Oakdale irrigation district can vote sufficient bonds to build all necessary reservoirs by bond issue, according to the advice given the directors by Attorney P. H. Griffin. Although the law limits the bonding capacity to 60 per cent of the valuation of the district, which is approximately $4,000,000, making the apparent limit $2,400,000, Mr. Griffin stated that the actual valuation instead of the assessed valuation would be considered by the bond commission in determining the validity of the bonds.

KLAMATH FALLS, ORE.—That the details for the formation of an irrigation district for the farmers of the Klamath basin are being completed as rapidly as possible is indicated by the fact that an order for a special meeting of the county court in October to consider the petition for a special election of the water users, has now been issued by the county court. Farmers and government officials who have gone into the matter carefully declare that there is every reason for making this change, which will do away with the Water Users' Association.

MERCED, CAL.—Pursuant to the action of the Company Farm Bureau, indorsing a proposal to campaign for the organization of a county irrigation district, the following committee will report to the directors at the November session on the advisability of the undertaking: E. G. Adams, M. A. Marshall and A. H. Poor. Federal Drainage Investigator Engineer Walter Weir is to make a survey of the county's drainage and irrigation needs and possibilities before the committee reports.

MANTECA, CAL.—The South San Joaquin irrigation district has taken over the Keystone Construction Company's contract for the remaining work on the Woodward reservoir. The work on the reservoir has been satisfactory, and has been accepted by the district, but the principal object in taking over construction of the remainder of the work is to give the district the opportunity of finding the most important part of the work at once, and leaving that part of it that is not needed at this time until the future. The Keystone Construction Company had practically completed the work on dams Nos. 2 and 3, except the puddling and putting on the finishing touches. Dam No. 4 has not been touched as yet, but this is not important, and the district will finish the work on the other dams first.

PARADISE, CAL.—Work of constructing the reservoir and dam for the Paradise Irrigation District on Little Butte Creek, Butte County, is being rushed that the big earth fill may be ready this year before the winter floods come. Already the tunnel for the outlet of irrigation water has been finished. The Paradise dam will hold back enough water annually to cover the entire district a foot deep. This is regarded as sufficient for irrigation needs on the ridge, which already enjoys ample rainfall during the winter season. The acreage in the district is about 10,500, practically all of which is capable of cultivation and much of which is already planted to trees. The dam at the base will be 400 feet thick, entirely of earth fill. Laying of pipe for the distributing system of the Paradise irrigation district will be commenced within two weeks, according to the announcement of the directors. The pipe will be laid at the rate of a mile a day.